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JONES (S. E.). **Control of Eggplant yellows.**—*Bull. Tex. agric. Exp. Sta.* 623, 17 pp., 2 figs., 1942.

Eggplant yellows, an infectious disease apparently caused by a virus, occurs in late summer and autumn in southern and central Texas, and what appears to be the same disease has also been reported from Oklahoma, Louisiana, Florida, and South Carolina. Conspicuous yellow spots appear in the young leaves and rapidly enlarge, often following the veins, until, in about 25 days, all the green chlorophyll is destroyed. The condition first occurs when the plants are eight to ten weeks old; it then rapidly increases. The disease was transmitted by budding within 31 days but not by the insects tested.

Control studies conducted from 1934 to 1939 on 9,092 plants in 54 field plots showed that sulphur, sulphur-pyrethrum, sulphur-cube, fuller's earth-cube, and hydrated lime dusts all gave effective control if applied before infection occurred. Practical control resulted when the plants were kept lightly covered with the dusts during the entire time they were in the seed-bed. Rather better control followed from four or more dustings at intervals of seven to ten days, beginning at transplanting. Almost complete control was obtained when the dusting was carried out both in the seed-bed and after transplanting. When dusting was begun after infection had taken place, the results were unsatisfactory. Soil applications of sulphur at 500 lb. per acre, both in the seed-bed and the field, gave 10 per cent. infection, as against 49·6 per cent. in the controls. Plants grown in the seed-bed in insect-proof cages showed half as much infection as the controls. The most economical form of control consisted in keeping the seed-bed covered lightly with plain dusting sulphur.

FRANCO DO AMARAL (J.). **Estudo do organismo causador da bacteriose da Mandioca.** [A study of the causal organism of a bacteriosis of Cassava.]—*Arq. Inst. biol., S. Paulo*, xiii, pp. 119–125, 2 pl., 1942. [English summary.]

An organism causing a serious vascular wilt of cassava was isolated in pure culture from a planting at Tremembé, São Paulo, Brazil. In inoculation experiments conducted during 1942 with six isolates of the organism, typical symptoms developed in plants of the varieties 'Vassourinha', 'Manipeba', 'Cambaia', and 'Gemedeira' after 11 or 13 days in summer, and after 30 days in winter. The causal organism, an unidentified species of *Phytomonas*, is a Gram-negative, non-sporing, motile rod with rounded ends, 1·6 to 2 by 0·6 to 0·9 $\mu$ with monotrichous flagella; in agar it forms round, raised, milky-white colonies, with glistening surface, entire edge, and viscid consistency; in broth it makes abundant growth with dense turbidity and much viscid sediment; it grows well in sugars, without producing acid or gas, completely hydrolyses starch, liquefies gelatine, and digests milk. The organism does not agree in all its characters with any of the known pathogens on cassava.

WAIN (R. L.) & WILKINSON (E. H.). **Investigations with various copper compounds in relation to 'damping-off' in Peas.**—*Rep. agric. hort. Res. Sta. Bristol, 1942*, pp. 59–64, [1943].

This is an expanded account of studies conducted at Long Ashton on the control of damping-off of peas, a preliminary note on which has already been noticed [*R. A. M.*, xxii, p. 191].

KEHL (H.). **Zur Keimungsphysiologie der Champignonsporen.** [A contribution to the physiology of Mushroom spore germination.]—*Gartenbauwiss.*, xvii, pp. 156–170, 1942. [Abs. in *Chem. Zbl.*, cxiv (i), 16, p. 1683, 1943.]

Mushroom [*Psalliota* spp.] spores must be sterilized to induce germination, and thanks to their exceptionally solid walls no appreciable reduction of viability is caused by the application of disinfectants, of which chloroform proved to be the most effective in tests at the Geisenheim (Rhine) Viticultural and Horticultural Research Institute. Four hours' treatment with chloroform sufficed for total sterilization, while the germinative capacity of the spores was not impaired even by several days' immersion. An acceleration of up to five days in germination was secured by this method of disinfection. Carbohydrates are indispensable to spore germination, which occurred within a $P_H$ range of 3·5 to 7.

DE ZEEUW (D. J.). **A method for obtaining single-spore cultures of Agaricus campestris.**—*Phytopathology*, xxxiii, 6, pp. 530–531, 1943.

A large number of uncontaminated spores of *Agaricus* [*Psalliota*] *campestris* were smeared on an agar slant with a sterile brush and allowed to germinate and grow for one to two weeks. When a solid mycelial mat had formed, the culture was killed by immersing the tube in boiling water. The dead mycelial mat was then aseptically removed, and the sterile medium used for hanging drops on cover slips over Van Tieghem cells. From 30 to 50 per cent. of the single spores of two commercial varieties of mushroom isolated and placed on this medium germinated in replicated tests. When 100 single spores were isolated and placed on unstaled medium, only about 5 per cent. germinated.

WILLIAMS (P. H.), SHEARD (ENID), SELMAN (I. W.), & READ (W. H.). **Plant diseases.**—*Rep. exp. Res. Sta. Cheshunt, 1942*, pp. 27–47, 1943.

In this report [cf. *R.A.M.*, xxii, p. 8] P. H. Williams discusses his experiments on testing the resistance of tomato seedlings to *Verticillium albo-atrum* and *V. dahliae* by sowing seeds in steamed soil, removing the seedlings when they showed two rough leaves, and dipping the roots in a liquid culture of the fungus, after which the plants were potted up in sterilized soil. Four weeks after potting, the plants were cut off at soil-level, and the total number of leaves and the number of dead and yellow leaves were counted.

When Ailsa Craig, Manx Marvel, and Riverside tomato plants were inoculated with *V. albo-atrum* and strain V. 243 (possibly *V. dahliae* or a saltant of *V. albo-atrum*), the mean percentages of dead and yellow leaves were, respectively, 34·2, 22·9, and 21·2 for the former fungus, and 35·8, 35·7, and 31·2 for the latter. Analysis of the data demonstrated that Manx Marvel and Riverside showed significantly less disease than Ailsa Craig when inoculated with *V. albo-atrum* and no difference when inoculated with V. 243. Ailsa Craig was attacked equally by both fungi, and Manx Marvel and Riverside were significantly less resistant to *V. albo-atrum* than to V. 243.

During July and August, Vetomold tomatoes attacked by *Cladosporium fulvum* [ibid., xxi, p. 172; xxii, p. 81] were received from several sources. Plants raised

from two samples of Vetomold seed sent in by a grower, one being the original strain supplied to him in 1940, and the other a strain obtained by him direct from the Vineland Station in 1941, and from Cheshunt seed of Ailsa Craig and Vetomold were sprayed with spores from the imported Vetomold leaves, and about one month later all showed infection. Later, the strains of Vetomold and Ailsa Craig were sprayed with spores from leaves from a greenhouse at Cheshunt and also with spores imported with the original specimens of Vetomold. Both strains of Vetomold inoculated with the fungus from Vetomold became infected. The Vetomold plants sprayed with the Cheshunt spores remained unaffected. Ailsa Craig was attacked in both cases. It appears that a strain of *C. fulvum* able to infect Vetomold is present in England.

Studies by I. W. Selman showed that when Potentate tomato plants were inoculated with tomato mosaic when the first truss was in bloom the best yield was obtained from plants grown without the addition of fresh lime (though old lime residues were present), but with the addition as a base dressing of 1 oz. sulphate of potash per 10 in. pot. A yield (mean of 16 plants) of 5 lb. 5 oz. per plant was obtained, of which 3 lb. 10 oz. consisted of unblemished ripe fruit. Uninoculated controls with similar manurial treatment yielded 6 lb. 5 oz. per plant (5 lb. 3 oz. unblemished). Evidently, it is possible to secure profitable crops by 'growing on' mosaic tomato plants, even when infection occurs at a very early stage. Roguing such plants is uneconomic, particularly in war.

E. Sheard states that in 1941 numerous specimens were received of outdoor tomatoes of Stonor's varieties showing pale brown, irregular spots, with a well-defined margin, and ranging in size from small spots to blotches covering one-third of the surface of the fruit. The lesions were not uniformly brown, but had the appearance of a darker brown network on a pale ground. No organism was isolated, and it was concluded that the defect was possibly due to weather conditions.

W. H. Read, after pointing out that no satisfactory method of controlling tomato stem rot (*Didymella lycopersici*) has yet been devised, describes the results obtained from attempts to kill the fungus on the plants, to destroy it in the soil, and to apply protective fungicides to the plants. Cutting out lesions on the stem above soil-level and painting the wounds with a fungicide proved useless. Infected soil was sterilized by heating to 122° F. for 10 minutes, and it is considered that this method should destroy the fungus under glasshouse conditions. In the laboratory, 48 hours' contact with formaldehyde (1 in 1,000), cresylic acid (1 in 850), and a proprietary emulsion of tar acids of higher boiling point than cresylic acid (1 in 430) destroyed the fungus. *D. lycopersici* appeared to be highly resistant to fungicidal action in the presence of plant juice. When a spore suspension was placed on a wound freshly made with a sharp knife and immediately treated with pastes of Bordeaux mixture, 5 per cent. lime-sulphur, flowers of sulphur, or lime, infection often resulted.

In tests of the control of *Phytophthora infestans* on tomatoes by various fungicides, though no infection developed, probably as a result of the weather conditions that prevailed, it was found that Bordeaux mixture of various strengths and cuprous oxide sprays hardened the plants; while Burgundy mixture (10–12½–100) caused considerable leaf scorch and left a heavy deposit on the fruit.

**Italy : phytopathological observations.**—*Int. Bull. Pl. Prot.*, xvii, 5, pp. 69M–70M, 1943.

The following information has been received from Royal Italian Cryptogamic Laboratory, Pavia. Wheat roots are subject to infection by at least two species of *Pythium*, one of which is prevalent and widely distributed, *Olpidiaster radicis* [*Olpidium brassicae*: *R.A.M.*, xviii, p. 821], *Ligniera* (*Sorosphaera*) *graminis* [cf. ibid., xii, p. 468], and *Phytophthora* sp.

A *Trichothecium* allied to *T. roseum* was isolated from the conidiophores of *Plasmopara viticola* on vine leaves, but attempts to induce the parasitization of the latter by the former were unsuccessful. The alleged suppression of the downy mildew fungus by *T. plasmoparae* in France [ibid., xi, p. 693] is thought rather to represent a kind of symbiosis between the pathogen of the higher plant and a saprophyte or hemi-saprophyte attacking the decaying organs of the host.

Samples of date palm from Libya showed infection by *Mauginiella scaettae*, the suggested inclusion of which in the genus *Geotrichum* [ibid., viii, p. 565] is not accepted on account of differences in (*a*) the mode of arthrospore disarticulation, effected in *M. scaettae* by the fragmentation of the very long cells, consisting of two to 40 elements, and (*b*) pathogenic characteristics. Material from the same source was also infected by smut (*Aspergillus phoenicis*).

*Cronartium asclepiadeum* caused severe damage to Austrian pine [*Pinus nigra*] in the Massa region of Tuscany.

**Sixteenth Annual Report of the Commonwealth Council for Scientific and Industrial Research for the year ended 30th June, 1942.**—74 pp., 1942.

This report from Australia [cf. *R.A.M.*, xxi, p. 405] contains, *inter alia*, the following items of interest. In further studies on wheat take-all (*Ophiobolus graminis*) [ibid., xxi, pp. 519, 520; xxii, p. 295], greenhouse experiments showed that while disease symptoms appeared in the ears of all inoculated plants, and while yield was significantly less in these than in the control plants, whiteheads developed only in dry soil conditions. Out-of-doors, significant differences were noted between crops grown (in drums) in soil alone and those grown in soil containing large quantities of burnt lime, though plants grown in soil to which large or small amounts of ground limestone or calcium sulphate were added were no better than the controls.

Contributory factors in the die-back or decline in apple trees, which in recent years has become increasingly prevalent on the lighter soil types in Tasmania, are soil erosion, excessive cultivation, ploughing too close to the trees, and unsatisfactory manuring; the detrimental effects of these have been aggravated by a succession of dry seasons.

Studies of the storage qualities of apples from trees on different rootstocks again showed that fruit from Malling VII rootstock had low, and that from Malling II high susceptibility to pit and breakdown; other stocks were intermediate. In surface-coating experiments, very little difference was found between the castor oil-shellac-alcohol bath and various wax emulsion coatings, as regards effectiveness, but the solutions had the practical advantages of durability and rapid drying. Treatment retarded colour change and reduced both shrivelling and Jonathan spot incidence. Storage pit and lenticel scald were also reduced, or, at least, the appearance of these disorders was delayed. With Sturmer apples, susceptibility to brown heart and alcoholic flavours increased rapidly with maturity. This variety should not be treated after the first week in May.

Experiments by the Victorian Department of Agriculture showed that yields of 200 lb. ergot [*Claviceps purpurea*] per acre [cf. ibid., xxi, p. 135] can be obtained if the rye is sown early in suitable districts, and proper methods for insuring high infection are followed. Satisfactory mechanical methods of separating the ergot have not yet been devised [ibid., xxii, p. 301], and hand-picking is uneconomic, unless the market price of ergot is very favourable.

A stock of Up-to-Date (Factor) potatoes free from virus X [ibid., xx, pp. 220, 592] was isolated during the previous season and is being multiplied, as is a stock of Tasmanian Bismarck, which is similarly free. Spotted wilt [ibid., xxii, p. 173] has become increasingly important in the potato crops in some areas,

and the most urgent question is whether the virus is transmitted through the tubers.

In the cold, wet conditions prevailing during the 1941 sowing period at Orbost, Victoria, treatment of commercial maize seed [against *Diplodia zeae*: ibid., xxi, p. 405] with agrosan gave a 38 per cent. increase in establishment and one of about 20 per cent. in yield. Peas or vetches [*Vicia* spp.] ploughed in as green manure about two months before sowing maize increased the yield, but oats similarly used as manure did not. The percentage of basally rotted stalks at harvest was greater in maize following the green manure crops than in maize following oats or without green manure, though the ears on the basally rotted stalks were seldom reduced in size. The percentage of rotted ears did not appear to be decreased by green manuring. Soil drought at or after tasseling reduced the severity of maize ear rot but increased that of localized stalk rot.

*Lupinus varians* was attacked by the common pea mosaic virus. The disease is present throughout the lupin-growing areas, wherever peas are grown near the lupins, but it appears to be economically unimportant. In the Perth area, the common garden shrub *Cassia corymbosa* was ascertained to be a host of the virus, in which it carried over during summer. To control the disease in the experimental lupin plots, householders in the vicinity were asked to remove affected *C. corymbosa* shrubs from their gardens, and grow only those pea varieties that are known to be immune from pea mosaic.

**Notes contributed by the Biological Branch.**—*Agric. Gaz. N.S.W.*, liv, 6, pp. 267–270, 3 figs., 1 graph, 1943.

Leaf curl of stone fruits ([peach] and nectarine) caused by *Taphrina deformans* [*R.A.M.*, xxi, pp. 147, 338] is stated to be readily controllable by spraying before bud-burst (preferably while the blossom buds are swelling) with Bordeaux mixture (6–4–40) or lime-sulphur 1 per cent. When conditions favour infection, Bordeaux mixture is slightly more effective than lime-sulphur; it is also more durable. If spraying has to be carried out before the buds swell, Bordeaux mixture is preferable. If lime-sulphur is used before bud swell and showers are experienced, the application must be repeated at a late stage of bud swell.

Grape black spot or anthracnose (*Elsinoe ampelina*) [ibid., xxi, pp. 319, 480] can be controlled by spraying with Bordeaux mixture (6–4–40) or lime-sulphur 1 in 8 just before bud-burst. A further application of Bordeaux mixture (6–4–50) should be made when the shoots are about 6 in. long. If the weather conditions favour infection two more applications should be given (at the 6–4–50 concentration), one just before blossoming and the other as soon as the fruit has set.

**Plant diseases and insect pests. Notes by the Biological Branch.**—*J. Dep. Agric. Vict.*, xli, 5, pp. 267–272, 7 figs.; 7, pp. 365–370, 9 figs., 1943.

Club root (*Plasmodiophora brassicae*) [*R.A.M.*, xx, p. 507; xxi, p. 442] of crucifers has been established for many years in some of the chief vegetable-growing areas of Victoria. It is mostly confined to localities with a heavy soil, and seems to be most prevalent in the Werribee Irrigation Settlement. In heavily infected soil the cultivation of crucifers should be abandoned for at least five years. Other control methods suggested consist in the application of agricultural lime at the rate of 1 to 2 tons per acre several months before planting, and watering the seed-beds at sowing and when the plants are 2 in. high with mercuric chloride 1 in 2,000. Clean cultivation to suppress weeds and the destruction by burning of diseased refuse are also recommended.

Collar rot [*Phytophthora* ? *citrophthora*: ibid., xvi, p. 169] is one of the most serious diseases affecting citrus trees in Victoria. The usual control measures are recommended.

Brown rot (*Sclerotinia fructicola*) of stone fruits has caused serious losses in Victoria during the past twenty years. Under certain conditions, infected fruits, which have fallen from the tree and been left lying on the ground, may produce apothecia. These bodies have been found in the Goulburn Valley, Victoria, and, if conditions are favourable to infection, blossom infection may result. Fallen fruits should be disturbed by ploughing or cultivating before the trees flower, and the angular strips within a few inches of the butt of the tree, which are often left undisturbed after ploughing, should be cultivated by hand. All stone fruit trees should be sprayed with Bordeaux mixture (6–4–40) as the buds swell in spring; peaches, plums, and cherries should be sprayed at the very early bud-burst stage. Apricots previously attacked by brown rot should be sprayed at the pink- and pink-white bud stages. Peach, plum, and cherry fruits may be treated with a dry-mix spray consisting of 16 lb. air-blown sulphur, 8 lb. fine-grade hydrated lime, and 1 lb. lime casein spreader, used at the rate of 25 lb. per 100 gals. water. This spray should be applied periodically after the fruit has formed, and during its subsequent development, but not during the six weeks preceding maturity, except on canning peaches, as the deposit detracts from the appearance of the fruit. Sulphur sprays should not be used on apricot fruits.

Experiments on the control of apricot scab (*Clasterosporium carpophilum*) showed that under the conditions prevailing in the Goulburn Valley thorough spraying with Bordeaux mixture (6–4–40), applied when the last leaves are falling and again at the pink-bud stage, reduced infection from 77 to 2 per cent.

The control of diseases of fruit trees caused by fungi that attack the trees through pruning and other wounds due to mechanical agency, including *Polystictus* spp., *Stereum purpureum*, and *Verticillium* sp., consists in trimming all wounds over ½ in. in diameter and then covering them with bituminous or white lead paint. If infection develops, the limb should be removed beyond the last sign of diseased tissue.

**1942 disease information for the Middle Atlantic States.**—*Plant Dis. Reptr Suppl.* 140, 49 pp., 1943. [Mimeographed.]

Notes are given on diseases of cereal and forage crops, fruits, ornamental plants and turf, potatoes, tobacco, and truck crops occuring during 1942 in the Middle Atlantic States. The information was assembled at the request of the chairman of the Middle Atlantic States Section of the American Phytopathological Society War Emergency Committee, R. S. Kirby, to supply plant pathologists with facts valuable for the planning of future research.

**Principales enfermedades parasitarias que fueron objeto de consulta en el primer semestre de 1942.** [The principal parasitic diseases which were the object of consultation during the first half of 1942.]—*Bol. Sanid. veg., Santiago*, ii, 1, 2 unnumbered pages between pp. 60 and 69, 1942.

Among the parasitic plant diseases investigated during the first half of 1942 by the phytopathologists attached to the Chilean Ministry of Agriculture [cf. *R.A.M.*, xxii, p. 241] were *Cycloconium oleaginum* on olive, *Peronospora* [*Plasmopara*] *halstedii* on sunflower, *Sphaeropsis pinastri* [*Diplodia pinea*] on *Abies pinsapo*, and *Tranzschelia* [*Puccinia*] *pruni-spinosae* on peach.

Henry (B. W.), Riker (A. J.), & Duggar (B. M.). **Thiamine in crown gall as measured with the Phycomyces assay.**—*J. agric. Res.*, lxvii, 3, pp. 89–110, 1 fig., 1 graph, 1943.

The relation of thiamin to crown gall (*Phytomonas* [*Bacterium*] *tumefaciens*) development [*R.A.M.*, xxii, p. 346] was studied in Wisconsin, using the *Phycomyces* assay [ibid., xv, p. 169] for all thiamin determinations and glycine as the

nitrogen source. In inoculation experiments with greenhouse and field tomatoes, greenhouse sunflowers, and field marigolds, it was found that thiamin concentrations were consistently higher in crown-gall tissue than in mature stem tissue of the same plant or of the uninoculated control. Almost the maximum concentration of thiamin was present at inoculation points within one week of inoculation and before visible galls developed; the concentration remained fairly constant during the period of rapid increase of gall size. It is suggested that the higher concentration of thiamin in crown galls as compared with mature stem tissue of inoculated or uninoculated plants is probably due, in the early stages of gall development, more to the presence of the crown-gall bacteria than to the meristematic nature of gall tissue. Bacteria from a partly attenuated culture contained more thiamin than those from a virulent culture and the minute galls produced by the former contained as high a concentration of thiamin as the large ones produced by the latter. There is no evidence that thiamin plays a causal part in crown-gall initiation or development beyond that of any essential food or growth factor present in that area of meristematic activity.

Baker (R. E. D.). **Witches' broom disease investigations. IV. Further notes on the susceptibility of I.C. selections at River Estate to witches' broom disease of Cacao.**—*Trop. Agriculture, Trin.*, xx, 8, pp. 156–158, 1943.

Further observations on the susceptibility to witches' broom [*Marasmius perniciosus*: *R.A.M.*, xxii, p. 242] of certain I.C. cacao selections at River Estate, Trinidad, showed that between March, 1942, and March, 1943, the disease had become considerably worse. By the latter date loss of pods was serious in this field for the first time. Among the first set of trees, I.C.S. 6 and 8 were still the best as regards the number of brooms. Among the second, I.C.S. 7 and 22 remained in the best group, with about half as many brooms as I.C.S. 53, while I.C.S. 45 came in the best group as regards total brooms. Among the third set, I.C.S. 2, 9, and 98 showed some resistance, the last two being of considerable promise. So far the best clones appear to be Nos. 6, 8, 9, 45, and 98.

Andrén (F.). **Några betningsresultat.** [Some disinfection results.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh.*, vii, 4, pp. 5–10, 1943.

Cereal seed-grain disinfection experiments were carried out as usual in Sweden during 1942 [cf. *R.A.M.*, xxii, p. 164], the results presented in this tabulated account, however, being confined to field trials with commercial preparations. The average increase in the winter wheat crop from the various treatments against bunt [*Tilletia caries* and *T. foetida*] is estimated at 12·4 per cent., the differences in efficiency between the individual plant-protectives not being deemed significant. A similar observation was made in respect of the treatments used for the control of snow mould (fusariosis) [*Calonectria graminicola*] of rye, the average increase in yield of which was computed at 7·1 per cent.; the attack was very mild. The barley crop was heavily infected by stripe disease [*Helminthosporium gramineum*], and the treated seed yielded on an average 18·9 per cent. more than the untreated: here again, however, there was no significant difference between the various preparations in toxicity to the pathogen. The discrepancies in the results obtained with the different fungicides in the oats loose smut [*Ustilago avenae*] tests are to some extent attributable to the partial use of the 'evacuation' method of inoculation [ibid., xxii, p. 300], in which the mycelium penetrates much deeper than in the case of spontaneous infection and is correspondingly harder to eliminate. Very satisfactory control was nevertheless effected by dusting with betoxin 61 and fusariol (300 gm. per 100 kg.) and immersion in 0·25 per cent. uspulun for one hour or 15 minutes in 0·1 per cent. mercuric chloride-formalin, the last-named giving almost absolute freedom from smut.

GASSNER (G.). **Beiträge zur Giftwirkung der Quecksilberalkyle.** [Contributions to the toxic action of the mercury alkyls.]—*Phytopath. Z.*, xiv, 4, pp. 385–389, 2 graphs, 1943.

The results of further tests with methyl mercury chloride, methyl mercury bromide, and methyl mercury iodide confirmed those of previous experiments by the author and Ilse Esdorn [*R.A.M.*, ii, p. 557] in regard to the fungicidal efficiency and highly favourable chemotherapeutical index (0·1) of these compounds. At a concentration of 1 in 500,000, for instance, one hour's immersion in any of the three virtually inhibited the germination of barley covered smut [*Ustilago hordei*] spores, while at 1 in 200,000 and upwards viability was totally destroyed. At the same time, no appreciable reduction in wheat seed-grain germination was caused by any of the compounds at or below 1 in 50,000.

**General seed treatment recommendations for field crops.**—*Plant Dis. Reptr*, xxvii, 9, pp. 202–203, 1943. [Mimeographed.]

This list of chemicals recommended for treatment of cereal seed is reprinted from a mimeographed leaflet issued by the War Committee of the American Phytopathological Society, 23rd March, 1943. Arasan and spergon are not recommended for use at present.

MUNDKUR (B. B.). **Studies in Indian cereal smuts. V. Mode of transmission of the Karnal bunt of Wheat.**—*Indian J. agric. Sci.*, xiii, 1, pp. 54–58, 1943.

Pot experiments have been in progress since 1938 with the object of determining the mode of transmission of the 'Karnal' bunt of wheat, caused by *Neovossia indica* [*R.A.M.*, xx, p. 179], which is prevalent in the Punjab and North-West Frontier Province, and may occur in the north-western districts of the United Provinces. Healthy seed was sown in heavily infested soil and bunted seed in both disease-free and severely infested soil, in the latter case at different depths, while plants raised from diseased seed in contaminated soil were cut back to induce tillering in the hope that symptoms would develop in the tillers. Only three bunted ears were formed in the infested pots throughout the whole course of the trials, a similar observation, however, being likewise made in the controls. These few cases are presumably attributable to natural infection, the manner in which this takes place being still obscure.

HOLTON (C. S.) & SUNESON (C. A.). **Wheat varietal reaction to dwarf bunt in the western Wheat region of the United States.**—*J. Amer. Soc. Agron.*, xxxv, 7, pp. 579–583, 1943.

The reaction of 52 varieties and hybrid selections of winter wheat to dwarf bunt [*Tilletia caries*] was determined by nursery tests in five localities in Washington, Idaho (two), Utah, and Montana [*R.A.M.*, xxi, p. 133], healthy seed being sown in soil presumed to be contaminated by spores of the smut. Thirty-one of the varieties, including Relief, Rex, Requa, Hymar, Minturki, Albit, and Redit, showed less than 10 per cent. bunt, so that ample highly resistant stock is available for breeding purposes; among the remainder the incidence of infection ranged from 11 per cent. in C.I. 11924 to 76·5 per cent. in Elgin, other susceptible varieties including Oro, Kharkof, Turkey (C.I. 6175), Rio, Carlson's Fife, Hybrid 128, Yogo, and No Name, with 22·5, 33·9, 37·8, 42, 48·7, 59, and 70·5 per cent., respectively. The maximum amount of infection developed at Logan, Utah, and the minimum at Troy, Idaho; these differences may be due to the physiologic races of the dwarf bunt organism present or to environmental factors influencing infection. Conflicting results were shown by Oro, due perhaps to the aggressive ordinary bunt suppressing the development of dwarf bunt at one locality.

Pugsley (A. T.). **Varietal resistance of Wheat to loose smut.**—*J. Aust. Inst. agric. Sci.*, ix, 2, pp. 86–88, 1 fig., 1943.

Inoculation experiments carried out in South Australia in 1941 and 1942 showed that the following wheat varieties were completely resistant to loose smut (*Ustilago tritici*), the inoculum being derived from a single plant in 1940, and maintained on several varieties since: Khapli, Doubbi, Ford, Dundee, Totadgin, Rapier, Koala, Hope, Gular, Gluyas, Bordan, Pusa 4, Noongar, Baart 38, and White Federation 38. These varieties are, however, likely to react differently towards other races of the fungus. The susceptibility of other test varieties [which are tabulated] varied up to 82 to 100 per cent. infection in different rows of Dindiloa.

Barrus (M. F.). **Yellow-spot disease of Wheat in New York State.**—*Plant Dis. Reptr*, xxvi, 11, pp. 246–247, 1942. [Mimeographed.]

The yellow spot disease of wheat, believed to be a new record for the United States, was observed in 1943 in several counties of New York State. The causal fungus was identified by A. G. Johnson as *Helminthosporium tritici-vulgaris* [*R.A.M.*, xvi, p. 664].

In a note, A. G. Johnson reports that the above disease has been found to occur abundantly in a winter wheat nursery and to some extent also in commercial fields of winter wheat in Maryland. It is suggested that the disease has probably been present for some time past, but has been confused with that caused by *H. sativum*. The leaf spots caused by *H. tritici-vulgaris*, particularly when they are small, have yellower margins and lighter brown centres than those caused by *H. sativum*.

Suneson (C. A.) & Santoni (Sylvia C.). **Barley varieties resistant to stripe, Helminthosporium gramineum Rabh.**—*J. Amer. Soc. Agron.*, xxxv, 8, pp. 736–737, 1943.

In preliminary experiments in California in 1942 and 1943 on the reaction to stripe (*Helminthosporium gramineum*) of 14 varieties of barley, the $F_1$ progeny of crosses with male-sterile plants were dusted with spores of the fungus immediately following mass pollination [*R.A.M.*, xxi, p. 445]. The degree of resistance of Vaughn, Arivat, Wisconsin Barbless, Trebi, Coast (Winter Tennessee), and Hannchen was sufficient to permit their war-time cultivation without seed treatment, if the proper dusts are not available. These varieties, with the exception of Wisconsin Barbless, are at present cultivated over about 1,000,000 acres in California and the bordering States. Three genetic groupings are suggested by the $F_1$ performance of the hybrids under observation: (1) resistant, with dominance nearly complete, (2) intermediate resistance or incomplete dominance, and (3) susceptible or dominance of susceptibility.

Boyd (A. E. W.). **The necessity for annual seed disinfection.**—*Scot. J. Agric.*, xxiv, 3, pp. 174–176, 1943.

The author describes an experiment on the control of leaf stripe (*Helminthosporium avenae*) [*R.A.M.*, xxii, pp. 128, 201], in which Star oats seed-grain was treated with disinfectant dusts A, B, and C and sown in pots and in the field. Estimates were made of the percentage braird (i.e., the number of seedlings that become established) and leaf stripe. Samples of the seed from the field plants were sown in pots in the following year, without disinfection, braird and leaf stripe estimates again being made. In the first pot test the grain treated with A, B, and C dusts and the untreated control gave, respectively, 94, 95, 109, and 100 per cent. braird, 0, 0, 0, and 63 per cent. leaf symptoms, and 21, 33, 19, and 90 per cent. coleoptile symptoms. In the field test the corresponding figures were 159, 160, 124, and 100 per cent. braird and 0, 1, 0, and 32 per cent. leaf symptoms. In the final test

they were 131, 110, 121, and 100 per cent. braird, 40, 40, 36, and 38 per cent. leaf symptoms, and 96, 96, 94, and 98 per cent. coleoptile symptoms. These figures show that seed treatment decreases leaf stripe and improves braird and crop, but does not protect the resulting seed from infection, which arises from wind-blown spores. Seed disinfection must be carried out every year, even if the seed comes from a crop grown from disinfected seed.

Godwin (H.). **Biological flora of the British Isles. Rhamnaceae : Rhamnus cathartica L., Frangula alnus Miller (Rhamnus frangula L.).**—*J. Ecol.*, xxxi, 1, pp. 66–68, 1943.

A. Smith contributes the section of this paper dealing with the fungi observed on *Rhamnus cathartica* and *R. frangula* in the British Isles. Both species serve as hosts of the aecidial stage of *Puccinia coronata* [*R.A.M.*, xvii, p. 737]. *Stereum purpureum* was associated with foliar silvering of *R. frangula* at Wicken Fen, Cambridgeshire. R. E. D. Baker (*J. Ecol.*, xxiv, pp. 110–112, 1936) established the pathogenicity of *Nectria cinnabarina* and *Fusarium* sp. in connexion with a die-back of the same host, while unpublished observations by F. T. Brooks further suggest the implication of a species of *Cytosporina* in the etiology of the trouble. A list is given of the remaining known fungal occupants of both *R.* spp., which are believed to be in the main saprophytic.

Rayss (T.) & Habelska (H.). **Rhamnus palaestina Boiss.—a new host of crown rust.**—*Palest. J. Bot.*, J Ser., ii, 4, p. 250, 1942.

In April, 1942, a shrub of *Rhamnus palaestina* in the Judean mountains was found to be heavily infested by the aecidial stage of *Puccinia coronata* [cf. preceding abstract]. Inoculation experiments with aecidiospores from this source on a number of Gramineae gave positive results only on *Avena barbata* and *Phalaris minor*, on which the teleutospores of the rust developed after 17 days and a month, respectively. *R. palaestina* is a new host for *Puccinia coronata*, but its part in the dissemination of the disease is unlikely to be important, since in Palestine *P. coronata* overwinters in the uredo stage. A rust, probably *P. coronata*, was also observed in the spring of 1942 on *R. alaternus* in the Jerusalem Botanic Garden.

Ullstrup (A. J.). **Diseases of Dent Corn in the United States.**—*Circ. U.S. Dep. Agric.* 674, 34 pp., 22 figs., 1943.

This paper contains much useful information, presented in a semi-popular form, on the symptoms, etiology, distribution, and control of maize diseases in the United States, including a leaf spot caused by an undetermined *Helminthosporium* stated to consist of two races, of which I resembles *Cochliobolus heterostrophus* and is confined to the inbred lines Pr, K61, and K44, while II produces narrow, irregular, chocolate-coloured spots on the leaves, which are, however, seldom attacked. Both races invade the ears, forming a black, mouldy growth over the kernels.

Walker (E. A.) & Magruder (J. W.). **Maryland field Corn leaf blight disease survey—1942.**—*Plant Dis. Reptr*, xxvii, 5–6, pp. 126–135, 1943. [Mimeographed.]

Data from a field survey of maize leaf blight (*Phytomonas* [*Xanthomonas*] *stewarti* and *Helminthosporium turcicum* [*R.A.M.*, xxii, p. 383] here assessed together as one disease) made in Maryland following a severe epiphytotic in 1942, showed that no hybrid or open-pollinated variety was immune, although some were more resistant than others. In general, early-planted and short-season varieties were more severely affected than were the late-planted or long-season ones. The average infection ranged from 87·2 to 20 (mean average 45) per

cent. in the hybrids, and from 38·8 to 29·2 (mean average 35·8) per cent. in the open-pollinated maize, the average infection for all varieties being 43·5 per cent. Among the hybrids, Funk G 135 and Kentucky Y 102 showed least leaf injury, while Pioneer 332 and 300 showed most; among the open-pollinated varieties Lancaster Sure Crop had the least and Golden Queen the most injury. The greatest frequency of leaf blight was within the range of 40 to 50 per cent. for hybrids, and one of 30 to 40 per cent. for all maize. Following the leaf blights, ear rots of maize were more prevalent than usual, and particularly on open-pollinated varieties: *Diplodia zeae* was about eight times more abundant than *Gibberella zeae*.

Hoppe (P. E.). **Comparison of certain mercury and non-metallic dusts for Corn seed treatment.**—*Phytopathology*, xxxiii, 7, pp. 602–606, 2 figs., 1943.

Particulars are given of preliminary trials at the Wisconsin Agricultural Experiment Station on the comparative merits of spergon (tetrachloro-para-benzoquinone), thiosan (50 per cent. tetramethyl thiuramdisulphide), new improved semesan jr. (1 per cent. ethyl mercury phosphate), and barbak D (not less than 6 per cent. mercuric phenyl cyanamide), for the control of the form of maize seedling blight caused by *Diplodia zeae*. In laboratory tests, in which surface-sterilized rotted kernels were dusted with the fungicides before transference to potato dextrose agar plates, spergon proved definitely inferior to the other three about equally effective preparations. The bulk of the kernels in all the treatments ultimately developed infection, but the percentage of those remaining healthy was highest in the semesan jr. series. In the field experiments (unavoidably omitting thiosan), new improved ceresan again gave the best results with 100 per cent. infected seed, the stand percentages for this fungicide, barbak D, spergon, and control being 91·1, 77·8, 40, and 24·4, respectively, and the figures for the corresponding treatments of 71 nearly disease-free inbred lines 84·5, 82·1, 85·4, and 79·8, respectively. Spergon appears to have equalled the mercury dusts in protecting the seed from soil infection, but it induced stunting in comparison with semesan jr. or barbak D and did not prevent the mesocotyls from becoming badly diseased.

Hoppe (P. E.). **Fusarium ear rot in Sweet Corn.**—*Plant Dis. Reptr.* xxvi, 21, p. 458, 1942. [Mimeographed.]

An epidemic of *Fusarium* ear rot (*Gibberella fujikuroi*) was observed in September, 1942, near Lodi, Wisconsin, in a field of Golden Cross Bantam sweet corn. The field had been planted in June, on a low but rich piece of land, and there had been frequent rains. Infections had developed in wounds following extensive pericarp cracking. The disease had spread rapidly from the numerous local infections, with the result that most of the ears had from one to several mouldy blotches an inch or more in diameter by the time the crop was ready. The whole field was rejected by the canners.

Koehler (B.). **Disease threatening Broom Corn production in Illinois.**—*Plant Dis. Reptr*, xxvii, 2, pp. 70–73, 1943. [Mimeographed.]

During 1941 and 1942 severe damage was caused to broomcorn [sorghum] in Illinois by a disease apparently due to *Colletotrichum graminicola* [cf. *R.A.M.*, xv, pp. 280, 494, 795]. The condition seemed to combine the features of leaf-spotting, root rot, and stalk rot. The root- and stalk-rot phase, which is the serious one, often originates in a break in the outer sclerenchyma, this making a weak place where infection starts. Once infection has entered the stalk, it spreads rapidly through the vascular tissues, frequently reaching the brush. The diseased areas turn red. The lower part of the stem becomes hollow, and masses of mycelium are often visible within. The first sign that the stalks are dying is a blanching

of the upper part, which occurs before or after the brush emerges. As the stalk dies it very often breaks over near the ground. By the time this happens numerous reddish-brown streaks or blotches have developed on the stem surfaces, the larger ones with grey centres, the result of the fungus coming to the surface from the interior. Spores are borne on these blotches. Similar blotches and spores on the leaves probably result from local infections. *C. graminicola* has caused a leaf spot of sorghum in Illinois for many years, but the present epidemic may be due to a new strain or race. In preliminary inoculation experiments with plants of the Black Spanish variety, 30 per cent. finally broke over.

Martin (W. J.). **A study of the genetics of Sorosporium syntherismae and Sphacelotheca panici-miliacei.** *Phytopathology*, xxxiii, 7, pp. 569–585, 4 figs., 1 graph, 1943.

The collections of *Sorosporium syntherismae* used in this study were obtained from two of its common hosts, *Panicum capillare* and *Cenchrus pauciflorus*, while the isolate of *Sphacelotheca panici-miliacei* originated on *P. miliaceum* [*R.A.M.*, xxi, p. 20]. The life-cycle and nuclear condition of the two species conform to those of the smuts in general, the sporidia being haploid and potentially gametic, infection occurring in the seedling stage of the host, the parasitic phase being dicaryotic, the mature chlamydospores diploid, and the reduction-division taking place during the germination of these organs.

The material of the two smuts at the author's disposal definitely represents distinct species, differing in sorus type as well as in the size, arrangement, and markings of the chlamydospores. The results of cross-inoculation experiments showed that *S. panici-miliacei* attacked only *P. miliaceum*, whereas *Sorosporium syntherismae* was pathogenic both to that species and *P. capillare*. Zundel reported [ibid., xix, p. 120] that some of his supposed collections of *Sphacelotheca panici-miliacei* on *P. miliaceum* closely resembled *Sorosporium syntherismae*, and from the writer's investigations it seems probable that they actually did belong to the latter species, or they may have been hybrids between the two smuts under discussion, which are roughly intermediate between the two parents in such characters as sorus type, spore dimensions and arrangement, spore wall reticulations, time required for spore germination, and pathogenicity. Spore size and wall markings are controlled by different factors, which appear to be independently inherited: the factor for verruculose spore walls behaves as a simple dominant over that for the smooth type. Less than 10 per cent. of the $F_1$ hybrid sporidia were viable. The interspecific dicaryophytes produced by hybridization between *S. syntherismae* and *Sphacelotheca panici-miliacei* were capable of infecting both *P. miliaceum* and *P. capillare*, the lines arising from different combinations varying in their pathogenicity, e.g., on the White Ural variety of *P. miliaceum* from 8·6 to 84·9 per cent.

Keast (J. C.). **Copper-dusted Wheat as a supplementary feed for Sheep.** *Agric. Gaz. N.S.W.*, liv, 6, p. 288, 1943.

Trials were made in response to enquiries by farmers as to whether stocks of wheat already treated against bunt [*Tilletia caries* and *T. foetida*] could be safely used as feed for sheep. Wheat treated by mixing 2 oz. of a proprietary copper dust with 60 lb. grain was given to sheep as part of their feed at the rate of ½ lb. per head daily for four months. No serious ill effects were produced, the treated grain being also as nutritious as untreated.

**Further improvements of boom sprayers.** *Calif. Citrogr.*, xxviii, 10, pp. 265, 276, 1 fig., 1943.

A description is given of recent developments in the mechanical application of

citrus sprays with power outfits. The advantages of these boom sprayers are a saving in man power and increased speed. The amount of spray used on one machine was 10 per cent. more than with hand spraying. The machines can apply 1,200 gals. or more of spray per hour. They will not cover thickly foliated or very large trees, and cannot be used where there is not ample room to drive between the rows.

Rose (D. H.), Brooks (C.), Bratley (C. O.), & Winston (J. R.). **Market diseases of fruits and vegetables: Citrus and other subtropical fruits.**—*Misc. Publ. U.S. Dep. Agric.* 498, 57 pp., 20 pl. (16 col.), 1943. 70 cents.

This bulletin, the eighth in a series designed to facilitate the recognition and diagnosis of economically important diseases of citrus, avocado, banana, fig, mango, olive, papaw, pineapple, and pomegranate, comprises summaries of the information available to date on the symptomatology, etiology, and control of fungal pathogens, non-parasitic and physiological disorders, and injuries due to miscellaneous causes, illustrated by excellent photographic and coloured plates and supplemented by a bibliography of 146 titles.

Arentsen (S.). **Estudio de la susceptibilidad presentada por diversas especies y variedades de Citrus al ataque de Phytophthora citrophthora (Sm. & Sm.) Leon.** [A study of the susceptibility shown by different Citrus species and varieties to infection by *Phytophthora citrophthora* (Sm. & Sm.) Leon.] *Bol. Sanid. veg., Santiago*, ii, 1, pp. 54–60, 3 figs., 1942.

In inoculation experiments carried out at the Biological Institute, São Paulo, Brazil, in 1941–2, to determine the relative susceptibility of 26 species or varieties of citrus to a bitter orange isolate of *Phytophthora citrophthora* from the Argentine, the most extensive trunk and branch lesions developed on the Villafranca lemon (average 183·3 sq. cm.). Other susceptible hosts included citrangequat [a cross between Willis citrange, *Poncirus trifoliata*×*Citrus sinensis*, and oval kumquat, *Fortunella margarita*], Satsuma orange (*C. nobilis* var. *unshiu*), and McCarthy and Duncan grapefruits (56·5, 56, 55, and 54·2 sq. cm., respectively). One strain of the sweet Persian lime was susceptible (59 sq. cm.) and another resistant (16). Resistance was further shown by two strains of Galician lime (9·5 and 18), Eureka lemon (19), Washington Navel orange (13·7), and Rio tangerine (14·7).

Lehman (S. G.). **Vapor action of certain fungicidal materials prepared for dusting Cotton seed.**—*Phytopathology*, xxxiii, 6, pp. 431–448, 1943.

In experimental disinfection of cotton seed with new improved ceresan the author found that at a rate of $\frac{1}{2}$ or $\frac{1}{4}$ oz. per bush. the improvement in seedling emergence was nearly as great as at higher rates. It was suggested that the effectiveness of the dust in so small quantities is due to the volatility of the mercurial ingredient. Experiments were therefore made to test the vapour action of mercurials on cotton seed, a weighed quantity of the test preparation being spread over the bottom of a desiccator or large culture dish, and the seed laid on wire racks above. The treated seeds were germinated in steamed sand or on paper towelling.

In one test, seed naturally infected with *Glomerella gossypii* and *Fusarium moniliforme* [*Gibberella fujikuroi*] was stored at laboratory temperature for three and sixteen days over new improved ceresan (ethyl mercury phosphate), while in another it was stored for two days over ceresan (ethyl mercury chloride), sufficient quantity of each dust being used to give equivalent weights of the active ingredients; another lot was dusted with ceresan. The controls gave only a low percentage of disease-free plants, while the seeds stored above ceresan and new improved ceresan, and those dusted with ceresan gave high percentages of healthy plants. Similar seed treated with the vapours from new improved ceresan at 11° C.

for 24 hours showed a higher percentage of germination and a much lower percentage of disease than the untreated controls. Exposure for 48 and 72 hours gave better control than exposure for 24 hours, but not such good control as did dusting. Exposure at 28° gave rather better control of seedling diseases than exposure at 14°. Vapour action by sanoseed (ethanol mercury chloride) was only weakly, if at all, effective at ordinary temperatures.

Vapour from ceresan, new improved ceresan, ethyl mercury borate, and ethyl mercury iodine was found to be lethal to conidia of *Glomerella gossypii* exposed on filter paper and on mycelium in Petri dishes. Because of the volatile nature of ethyl mercury chloride and ethyl mercury phosphate and their ability to condense on and adhere to cotton seed and seed-infecting fungi, very small ratios of quantity of chemical to quantity of seed are effective. The vapour action of ethyl mercury chloride and ethyl mercury phosphate is effective in the range of temperature (5° to 38°) likely to obtain between the treating and sowing of the seed.

In other tests the vapours of semesan (hydroxymercuro-chlorophenol), creosote dust, benzol, benzine (petroleum ether), para-dichlorobenzene, and picric acid exercised no inhibitory effect on air-dry conidia of *G. gossypii*. The germination of the conidia of this fungus was, however, reduced or prevented by the vapours of alkylmercuricacetyleneurea, leytosan (phenomercuricurea), 154–6B, chloropicrin, ethyl ether, and trioxymethane.

Ray (W.). **The rate of application of ceresan to Cotton seed.**—*Plant Dis. Reptr*, xxvi, 22, pp. 474–476, 1942. [Mimeographed.]

When seed of Stoneville 2B cotton (1) fuzzy, (2) re-ginned, and (3) acid-delinted was treated with new improved ceresan at the rates of ½, 1, and 1½ oz. per bush. and planted, the treatment, regardless of the rate of application and the kind of seed, gave stands statistically superior to those of the controls. No significant differences were found for the amount of ceresan applied when expressed in percentage of final stand. The acid-delinted (gravity-graded) seed was superior in point of stand to the other kinds. These results show that the amount of ceresan applied to fuzzy, re-ginned, and acid-delinted cotton seed can safely be reduced to less than 1½ oz. per bush.

Smith (H. P.) & Byrom (M. H.). **Effects of planter attachments and seed treatment on stands of Cotton.**—*Bull. Tex. agric. Exp. Sta.* 621, 16 pp., 7 figs., 1942.

Undelinted cotton seed treated with ceresan, lime, and sulphur at Texas Agricultural College Station gave, respectively, 71, 55, and 59·6 per cent. average emergence, as against 59·8 per cent. for the control, the corresponding figures for Nacogdoches Substation being 83, 54, 58, and 59 per cent. The figures for delinted seed similarly treated were 85·4, 73·6, 79·3, and 80·5 per cent. in the former place and 89·4, 72·5, 82·8, and 80 per cent. for the latter. Thus, with both undelinted and delinted seed, ceresan treatment substantially increased stands as compared with lime or sulphur or no treatment. Lime appeared to reduce germination, while sulphur had little, if any, effect.

Arndt (C. H.). **Pythium ultimum and the damping-off of Cotton seedlings.**—*Phytopathology*, xxxiii, 7, pp. 607–611, 1943.

*Pythium ultimum* has been found to be a common agent of cotton seedling damping-off in sandy loam soil in South Carolina when planting is followed by cool, wet weather. In experiments in which Cleveland Big Boll seedlings from acid-delinted, sterilized seed were grown in soil inoculated with a raisin-oatmeal agar culture of the fungus at temperatures of 18°, 21°, 24°, 27°, and 30° C., and a moisture content of 60 per cent., only slight infection occurred at 30°, but severe at lower temperatures, all the plants being killed at 21° and 18°. The results

secured when the seedlings were grown for six or twelve days at 30° in infested soil and then transferred to 22° indicate that *P. ultimum* will cause heavy losses through damping-off only if conditions favouring infection develop before the host reaches a stage of maturity comparable to that attained in a growth period of six days at 30°.

Miller (P. R.) & Weindling (R.). **Cotton seedling diseases and boll rots. Distribution and dissemination.**—*Plant Dis. Reptr. Suppl.* 141. pp. 53-78. 2 maps. 1943. [Mimeographed.]

A summary is given of surveys of cotton diseases conducted from 1938 to 1941 in 14 American states [*R.A.M.*, xxi. p. 196]. *Glomerella gossypii* was recovered from 81·2 per cent. of the diseased seedling samples and from 67·8 per cent. of the bolls. It was widely distributed throughout the south-eastern states, but in Texas and Oklahoma its occurrence is limited to the eastern portions. The failure to find this fungus in the western Belt is attributed to unfavourable, dry conditions preventing its survival during the period between the damping-off and the boll rot stages.

Experiments conducted during the surveys showed that a simple relationship between climate and relative abundance of *G. gossypii* could not be established, the data indicating that in addition to rainfall other factors are important, such as availability of dead plant tissue and of shade provided by close stands. The fungus was found to survive the summer in Texas on the stems, leaves, and bracts of cotton plants; it is suggested that it did so in a quiescent form and that the unusually wet weather in the spring of 1941 provided better conditions for its persistence than in ordinary years. Latent infections of stems, leaves, and other organs of the cotton plant often occur in the eastern parts of the cotton belt, to be followed, when moisture conditions become favourable, by saprophytic development in rotting tissues, thus providing potential sources of inoculum for boll infection and seed infestation.

In another set of experiments in South Carolina, contamination was carried over from infected trash to seed cotton, in proportion to the spore load of the trash, and from severely contaminated seed samples to those ginned subsequently. It is concluded that contamination of seed in the gin accounts for much of the *Glomerella* damping-off of seedlings in the eastern part of the cotton belt, and that infected trash plays an important role in this process.

In ginning tests with seed samples from South Carolina and Georgia (all containing *G. gossypii*) and from Oklahoma and Texas (all free from infection), it was found that after ginning the infected cotton, spores left on the ginning equipment caused sufficient contamination of the disease-free samples ginned subsequently to be detected by the spore load determination method. The number, per seed, of spores of *Fusarium*, *Diplodia*, and *Alternaria* spp. was generally lower after ginning than before.

When *G. gossypii*-contaminated seed was planted in 20 different localities, spore load determinations, made on seed after ginning, showed that relatively high spore loads were present on seed from localities in the more humid belt, e.g., coastal areas, and low loads on those from the inland sections of the eastern cotton belt where lower humidity prevails; no spores were found on seed from the sub-humid and semi-arid belt of Texas and Oklahoma.

Goodayage (J. E.). **Mildewed Cotton fabrics.** *Amer. Dyest. Reptr.* xxxii. 12. pp. P265–P270, 1943.

A semi-popular account is given of the structure and life-history of some of the principal agents of mildew in cotton fabrics [*R.A.M.*, xxii. p. 396], with special reference to the conditions prevailing in the tropics, where damage to military clothing and equipment from this source is stated to constitute a major problem

for the Philadelphia Quartermaster Depot. The author then enumerates the fungicides fulfilling the necessary requirements and describes three methods of applying them, i.e., by an organic solvent, precipitation, and a single bath, and briefly discusses their relative merits. The outstanding fungicidal properties of copper naphthenate are to some extent vitiated by its penetrating odour and production of colour on the treated fabric, the objectionable smell being also characteristic of the slightly less effective zinc naphthenate. Pentachlorophenol, which inhibits the growth both of cellulose-destroying (*Chaetomium globosum* and *Metarrhizium* [? *anisopliae*]) and superficial moulds, e.g., *Aspergillus* and *Penicillium* spp., including *P. glaucum*, and is particularly effective when applied by the two-bath method, is an irritant and therefore of limited utility in the protection of clothing materials. Another phenolic derivative, dihydroxy-dichlor-diphenylmethane, however, combines toxicity to all types of moulds with absence of irritant properties. The cheap and efficient ortho-phenylphenol has the drawback of poor water repellancy, involving rapid removal by leaching. The cuprammonium products are open to various objections precluding their large-scale use. The most remarkable of the mercury compounds used against textile mildews is phenyl mercury trinitriloethanol lactate, while promise has also been shown by the newly developed quaternary amines, alkyl dimethylbenzyl ammonium salts and cetyl pyridinium chloride, and the wholly organic amino-guaiacol benzothiazole iminourea. The 'modifying' leaching or spray and the accelerated mildew performance tests used at the Depot are briefly described.

Schaerffenberg (B.). **Die biologische Bekämpfung des Maikäfers und seiner Larve mit Beauveria densa.** [The biological control of the Cockchafer and its larva with *Beauveria densa*.] *Anz. Schädlingsk.*, xvii, pp. 53-55, 1941. [Abs. in *Z. PflKrankh.*, lii, 12, p. 563, 1942.]

Previous failures in the experimental control of the cockchafer [*Melolontha melolontha*] by means of *Beauveria densa* are attributed to differences between the insect and fungus requirements in respect of soil conditions. Theoretically, the inhibitory functions of the fungus should operate most successfully in damp forest soils well supplied with humus, whereas mass multiplication of the cockchafer is effected chiefly in dry, sandy situations. Laboratory tests confirmed this hypothesis to the extent of showing that infection by *B. densa* takes place more readily under the former than under the latter conditions.

Chada (H. L.), Ditman (J. A.), & Daigh (F. C.). **Progress during 1942 of the program for the colonization of the milky disease of Japanese Beetle larvae in Delaware.** *Trans. Peninsula hort. Soc.*, xxxii, 5, pp. 86-92, 1 fig., 1943.

This is the progress report for 1942 on the experimental establishment of type A milky disease (*Bacillus popilliae*) of Japanese beetle (*Popillia japonica*) larvae [*R.A.M.*, xxii, p. 137] in Delaware.

During the autumn and winter of 1941-2, some 213,000 fully-grown larvae were dug from sod in a heavily infested area and stored in cans of soil. Inoculation and incubation were effected at the Delaware Agricultural Experiment Station. Type B milky disease (*B. lentimorbus*) was found to have infected some of the larvae, but it was considered unsuitable for this work.

Of 129,624 larvae inoculated, only 0·5 per cent. failed to develop the disease and from 70,878 diseased larvae 2,208 lb. of finished spore dust were produced.

The results of the survey, while not entirely conclusive, indicate that the milky disease is becoming established on the colonization plots, as is shown by the numbers of diseased larvae. The reduction in numbers of larvae and the corresponding reduction in adult beetle populations observed during the summer cannot,

however, be attributed solely to the establishment of the disease. Other factors, such as adverse climatic conditions, have not been without effect.

FORSYTH (D. D.) & SCHUSTER (M. L.). **Abnormal leaf formation on Flax seedlings caused by spergon.** *J. Amer. Soc. Agron.*, xxxv, 8, pp. 733–735, 2 figs., 1943.

Some 80 per cent. of Bison and Redwing flax seedlings arising from seed treated with spergon (2 oz. per bush.) prior to sowing on 6th April, 1942, at the Washington Agricultural Experiment Station, were observed on 10th May to show a foliar abnormality consisting in the apparent lateral fusion of two to six leaves at the same node, the corresponding incidence for the sowings of 18th and 20th April being 30 per cent. The distortion usually involved the fifth to the tenth leaf above the cotyledons. In greenhouse tests carried out in 1943 evidence was obtained that the abnormality was due to treatment with spergon, the prevalence increasing with the dosage. The experiments were made with machine-threshed seed, the seed coats of 65 to 75 per cent. of which were found on microscopic examination to bear minute cracks or open breaks, providing a channel of entry to the epicotyl for the disinfectant.

LYLE (E. W.). **Black-spot on Rose canes.**—*Amer. Rose Ann.*, *1943*, pp. 155–156, 1 fig., 1943.

Attention is drawn to the occurrence of black spot [*Diplocarpon rosae*: *R.A.M.*, xxii, p. 24] on rose canes, where the minute lesions are readily overlooked in contrast to the more conspicuous effects on the foliage. Spores from cane spots have been known to germinate to the extent of 76 per cent., and may therefore constitute a source of inoculum for the propagation of the fungus in gardens from which all fallen leaves have been removed during the dormant period. Both leaf and cane lesions have been observed on Susan Louise, previously reported to be immune (*Plant Dis. Reptr.* xxiv, pp. 478–480, 1940), and in a greenhouse inoculation test on the same variety infection also developed on the canes and leaves, nearly all the latter being lost. This variety is, however, probably more resistant to black spot than many others, though the Welch Multiflora understock represents one of the few cases of true immunity. The application of fungicides against black spot should be continued well into the autumn. In the commercial rose fields of eastern Texas very satisfactory control of *D. rosae* has been secured with a mixture of 90 per cent. 325-mesh dusting sulphur and 10 per cent. Tennessee Copper 34, other preparations suitable for combination with the former at 5 to 15 per cent. including cuprocide GA, cupro K, copper oxychloride sulphate, spray cop, zinc coposil, copper hydro 40, and Dow Bordow.

WEISS (F.). **Notes on some diseases of ornamentals.**—*Plant Dis. Reptr.* xxvi, 15, pp. 331–333, 1942. [Mimeographed.]

*Colletotrichum trichellum* [*R.A.M.*, xiii, p. 309] was found causing a serious stem disease as well as a leaf spot of ivy, *Hedera helix*, for which the name anthracnose is considered appropriate. The examined specimens were collected in a ground bed in 1942.

The alpha conidial stage of *Phomopsis livella* (but not the beta) was isolated in 1942 from the stem bases and, after incubation, from stem cankers of *Vinca minor* (received among other localities from Washington, Virginia, and Maryland), indicating that the fungus is definitely parasitic on this host.

*Phytophthora cactorum* [ibid., xii, p. 696] is reported to have caused a severe top blight and in some cases the death of hybrid rhododendrons in Washington. This is the most southerly record of this disease in the United States.

Lihnell (D.). **Undersökningar över 'blad-och-grentorka' hos importerade Azaleor.** [Investigations on 'leaf and twig blight' in imported Azaleas.]—*Medd. Växtskyddsanst., Stockh.*, 40, 74 pp., 14 figs., 2 diags., 1 graph, 1943. [English summary.]

This is a comprehensive, tabulated account of investigations on an economically important leaf and twig blight of azaleas (*Rhododendron* spp.) imported into Sweden, mostly from Belgium [cf. *R.A.M.*, vi, p. 615, vii, p. 640], for forcing during the winter, among the varieties chiefly affected being Mme Petrick, Paul Schäme, Theo Findeisen, and Mme Aug. van Damme. The most conspicuous symptom of the disease is copious defoliation of the acropetal type characteristic of normal leaf fall, the subsequent twig blight, however, beginning at the apex and progressing downwards towards the main branch. Blackish-brown blotches soon develop on the dead and dying leaves as a result of infection by *Pestalotia* spp. [ibid., xiv, p. 173], including *P. rhododendri* (group), *P. macrotricha* [ibid., xiii, p. 598], *P. guepini* [ibid., xi, p. 650], *P. vermiformis* [ibid., xiii, p. 598], and an as yet unidentified, possibly new species, *P.* 53, characterized by conidia measuring 19 by 8$\mu$, the two dark brown middle cells 13$\mu$ in length, and setae 13 to 25$\mu$ long. The pathogenicity of these organisms, however, could not be established by inoculation tests. The cause of the trouble was accordingly sought in adverse environmental factors, decisive among which was experimentally shown to be the carbon dioxide poisoning sustained during transport in inadequately ventilated crates.

Lihnell (D.). **Hur se edra Dahlior ut?** [How do your Dahlias look?]—*Växtskyddsnotiser, Växtskyddsanst., Stockh.*, vii, 4, pp. 3–5, 3 figs., 1943.

This is a popular note on the mosaic disease of *Dahlia variabilis*, which is stated to be so widespread in Sweden that an extensive planting without stunted and mottled individuals is a rarity. Recently imported consignments, alleged to be from Denmark, were found, moreover, to show 100 per cent. infection. Growers are urged to eradicate any suspected plantings and to use only healthy material for propagation, the new beds to be located as far as possible from those already in existence.

Kreitlow (K. W.). **Sclerotium rhizodes on grasses in Pennsylvania.**—*Plant Dis. Reptr*, xxvi, 16, pp. 360–361, 1942. [Mimeographed.]

*Sclerotium rhizodes* was recently observed on leaves of *Poa pratensis* and *Agrostis alba* in Pennsylvania, this apparently constituting the first record of the disease in the State.

Herbert (D. A.). **Diseases of native plants in Queensland.**—*J. Aust. Inst. agric. Sci.*, ix, 2, pp. 63–68, 1943.

In this paper, given as the presidential address to the Queensland Branch of the Australian Institute of Agricultural Science on 12th March, 1943, the author discusses, *inter alia*, the ergot situation in Australia, where records of *Claviceps purpurea* on grasses have not been substantiated by R. F. Langdon (*Proc. roy. Soc. Qd*, liv, pp. 23–32, 1942), the ergot on *Bothriochoa intermedia*, for instance, being *C. pusilla* [*R.A.M.*, xxi, p. 81], which probably also occurs in India and Ceylon. The first official record of paspalum ergot [*C. paspali*] was that of the epidemic on *Paspalum dilatatum* in 1935–6 [ibid., xv, p. 724], but *P. orbiculare*, a native grass, was observed to be affected in 1934. Among important native plant diseases mention is made of *Uromycladium tepperianum*, which may destroy commercial plantations of *Acacia pycantha*. Other points dealt with include the problem of deciding whether a parasite is introduced or native, variations within fungal species, and geographical considerations affecting plant diseases.

Young (P. A.). **A canker disease of Crotalaria spectabilis in Texas.** – *Plant Dis. Reptr*, xxvi, 20, p. 438, 1942. [Mimeographed.]

During dry summer weather in 1941 and 1942, numerous *Crotalaria spectabilis* plants at the Tomato Disease Laboratory, Jacksonville, Texas, appear to succumb to a canker disease of the stem and upper part of the tap-root. A white mould was occasionally observed on the cankers near the crown. Cultures from affected material almost invariably yielded *Sclerotium* (*Rhizoctonia*) *bataticola* [*Macrophomina phaseoli*]. Further investigations are to be made.

Weimer (J. L.). **The thinning of Crotalaria stands in Southeastern United States.** – *Plant Dis. Reptr*, xxvii, 3–4, pp. 110–111, 1943. [Mimeographed.]

Gradual thinning of *Crotalaria* stands in south-eastern regions of the United States, where several species of the genus are used as summer cover crops, was found to be due to a wilt associated with a number of fungi, of which the following were proved to be pathogenic to *C. intermedia*: *Rhizoctonia* [*Corticium*] *solani*, *R.* sp., *Macrophomina phaseoli* [see preceding abstract], *Sclerotium rolfsii*, and a strain of *Fusarium oxysporum*. Other fungi isolated, but not found pathogenic under the experimental conditions, were *Phoma* sp., *F. solani*, and an organism that forms pycnidia resembling those of *Diaporthe crotalariae*. *C. solani* was isolated most consistently from the younger plants, but was not found at all in some lots. Normally the *Crotalaria* stands are maintained by 'volunteers' for a number of years and the thinning makes it necessary to re-sow more frequently.

Chilton (S. J. P.), Henson (L.), & Johnson (H. W.). **Fungi reported on species of Medicago, Melilotus, and Trifolium.** *Misc. Publ. U.S. Dep. Agric.* 499, 152 pp., 1943. 20 cents.

The increasing use of *Medicago*, *Melilotus*, and *Trifolium* spp. as war-time substitutes for nitrogenous fertilizers has prompted the publication of this bulletin, which comprises lists of the fungal pathogens of the three crops, arranged both under hosts and fungi, as well as 1,733 bibliographical references to the relevant literature.

Fischer (G. W.), Sprague (R.), Johnson (H. W.), & Hardison (J. R.). **Host and pathogen indices to the diseases observed on grasses in certain western States during 1941.**—*Plant Dis. Reptr, Suppl.* 137, pp. 87–144, 1942. [Mimeographed.]

This is a summary of the data obtained from collections and observations of grass diseases made during 1941 in the States of Arizona, California, Idaho, Minnesota, Nebraska, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming [cf. *R.A.M.*, xxi, p. 493]. The total number of diseases enumerated on 259 grass species and varieties is 161, including *Puccinia graminis*, *Fusarium scirpi* var. *acuminatum* [ibid., xx, p. 353], *P. rubigo-vera*, *P. glumarum*, *Scolecotrichum graminis*, *Helminthosporium sativum*, *Claviceps purpurea*, *Sclerophoma donacis* and its varieties, and *Pythium arrhenomanes* on 81, 63, 54, 53, 53, 53, 50, 43, and 42 hosts, respectively.

Chester (K. S.) & Lefebvre (C. L.). **Ergot epiphytotic in southwestern pastures.**— *Plant Dis. Reptr*, xxvi, 19, pp. 408–410, 1942. [Mimeographed.]

In the winter of 1941–2 many cases of cattle abortion were reported in the vicinity of the Texas Panhandle, and it was ascertained that the affected animals have fed on big bluestem (*Andropogon furcatus*), sand bluestem (*A. hallii*), and Indian grass (*Sorghastrum nutans*), all of which bore considerable quantities of ergot, tentatively identified as *Claviceps purpurea*. During 1941 ergot was exceptionally prevalent in the adjacent States, and in the spring of 1942 an examination

of the pastures in Hemphill County, in the Texas Panhandle, showed abundant ergot present in wild rye grasses (*Elymus canadensis* and *E. virginicus*). Infestation ranged from 5 per cent. or more in western wheat grass (*Agropyron Smithii*) to an estimated 100 per cent. in Canada wild rye. The soil under the wild rye was littered with sclerotia, and individual heads showed 1 to 27 sclerotia each. A 10-bush, sample of western wheat grass seed from Booker, Texas, contained 41 per cent. ergot by weight. The paper concludes with practical suggestions for ergot control in the conditions prevailing in the Southern Great Plains.

Mühle (E.). **Die Rostpilze der wichtigsten zur Samengewinnung angebauten Futtergräser.** [The rust fungi of the most important fodder grasses cultivated for seed production.]—*Phytopath. Z.*, xiv, 1, pp. 83–101, 1942.

This is a critical, tabulated survey of the literature on grass rusts, of which the following have been observed by the writer or reported by the Biological Institute during the last 20 years in Germany: *Puccinia graminis* on *Agrostis alba*, *Alopecurus pratensis*, *Arrhenatherum avenaceum*, *Avena flavescens*, *Bromus inermis*, *Dactylis glomerata*, *Festuca ovina*, *Lolium perenne*, and *Phalaris arundinacea*, *Puccinia coronata* on *Agrostis alba*, *Alopecurus pratensis*, *Arrhenatherum avenaceum*, *D. glomerata*, *F. pratensis*, *L. italicum*, and *L. perenne*, *P. bromivora* on *B. inermis*, *P. festucae* on *F. ovina* and *F. rubra*, *P. persistens* on *Poa pratensis*, *Puccinia phalaridis* on *Phalaris arundinacea*, *Puccinia phlei-pratensis* on *Phleum pratense*, *Puccinia poarum* on *Poa fertilis* and *P. pratensis*, and *Puccinia triseti* on *Avena flavescens*. Of recent years the heaviest damage has been sustained by stands of *Alopecurus pratensis*, *F. pratensis*, *L. perenne*, *Phleum pratense*, and *Poa pratensis*. The development of rust-resistant types of grass is the most promising control measure and the problems confronting the plant-breeder in this connexion are discussed. A bibliography of 83 titles is appended.

Stephens (C. G.) & Oertel (A. C.). **Responses of plants to molybdenum in pot experiments on the Cressy shaley clay-loam.**—*J. Coun. sci. industr. Res. Aust.*, xvi, 2, pp. 69–73, 2 graphs, 1943.

In pot experiments with subterranean clover on Cressy shaley clay-loam, an Australian soil capable of reverting superphosphate, the addition of very small additions of molybdenum salts induced an intensely dark green colour of the plants contrasting with the pale green of the untreated controls. The yields of the treated plants were increased from an average of 7·4 to 8·75 gm. per pot and the molybdenum content of the harvested material from 0·5 to 2 p.p.m. In further experiments with perennial rye grass [*Lolium perenne*] and white clover no colour change in the former was noted but in the latter the untreated showed increasing intensity of greenness with increased liming and the treated were uniformly dark green; the yields and molybdenum contents were increased in both plants by the addition of molybdenum salts, the evidence indicating that availability of molybdenum increases in passing from acid to alkaline soils. Spectrochemical analysis showed a minimum requirement of 1 p.p.m. dry material for normal growth.

Kreitlow (K. W.). **Investigations on seed treatment of forage grasses and legumes for control of damping-off.**—*Plant Dis. Reptr*, xxvii, 3 4, pp. 111–112, 1943. [Mimeographed.]

In preliminary tests carried out in the field on seven different dates in the spring and autumn of 1942, Sudan grass [*Sorghum sudanense*] seed treated against pre-emergence damping-off averaged 12 per cent. increase in stand over untreated seed, the figure in one case reaching 24 per cent. The best results were given by spergon and semesan dusts, while Du Bay 1205 FF and yellow cuprocide were slightly less beneficial. In greenhouse tests with Sudan grass and known patho-

genic cultures of *Pythium*, the stand was more than doubled as a result of using treated seed.

In field tests with lucerne, stands were increased by 5 to 17 per cent. when the seeds were dusted with yellow cuprocide, the average increase for five tests being 8 per cent. Treatment with spergon and Du Bay gave similar results. Treatment of red clover [*Trifolium pratense*] seed with Du Bay 1205 FF gave an average increase in stand of 9 per cent., the greatest increase for any one planting being 12 per cent.

Wellhausen (E. J.), Kreitlow (K. W.), & Leach (J. G.). **Observations of the prevalence and economic importance of stripe smut (Ustilago striaeformis) on Bluegrass.**—*Plant Dis. Reptr.* xxvii, 1, pp. 23–24, 1943. [Mimeographed.]

Of a total of 504 plugs of sod taken at random from typical bluegrass (*Poa pratensis*) pastures in West Virginia and planted at Morgantown for observation, smut (*Ustilago striaeformis*) [*R.A.M.*, xix, p. 351] developed in plants from 15 per cent. of the plugs. A survey then revealed that the disease is widely prevalent both in West Virginia and Pennsylvania. No pasture was found to be completely unaffected, and in some, over 25 per cent. of the plants were attacked. It is considered that in any programme of bluegrass improvement, smut resistance will have to be taken into consideration.

Aitken (Y.) & Grieve (B. J.). **A mosaic virus of Subterranean Clover.**—*J. Aust. Inst. agric. Sci.*, ix, 2, pp. 81–82, 1943.

For some years past, mosaic symptoms and marked stunting have been present on *Trifolium subterraneum* at Burnley Gardens, Victoria, and in 1941 and 1942 it became apparent that the disease was widespread in the State. Rapid spread has occurred in the affected areas, resulting in a 50 per cent. reduction in spring growth. On *T. subterraneum* the first symptom is clearing of the main veins of young leaves. Lamina mottling follows, becoming progressively more intense. The leaves are distorted, assuming a narrow wedge shape with a wavy margin. The infected plants are dwarfed. Seed production may be greatly reduced, and there was some evidence of seed transmission.

Experimental evidence demonstrated that the disease was transmitted by expressed juice, using the spatula and carborundum method. Dilutions up to 1 in 1,000 were effective. Transmission of the virus to *T. incarnatum* and then to *Phaseolus vulgaris* resulted in a higher percentage of infection with more severe symptoms than was the case when the inoculation was made to French bean directly. Aphids were ascertained to transmit the virus. Heating at 60° C. for 10 minutes resulted in complete inactivation. After 24 hours the percentage of successful transfers was one-third of that recorded immediately on extraction of the juice; after 48 hours no transfer could be obtained.

The virus differs from common pea mosaic in infecting *P. vulgaris*, soy-bean, and sweet clover (*Melilotus alba*); from common bean mosaic in infecting French bean var. No. 5 Refugee, blue lupin (*Lupinus angustifolius*), *M. alba*, soy-bean, *Trifolium hybridum*, *T. incarnatum*, *T. pratense*, and peas, and in producing much more severe symptoms on French bean; from yellow bean mosaic (white sweet clover mosaic) in infecting *T. hybridum*, *T. pratense*, *P. lunatus* (Henderson's Lima bean); and from alsike clover virus 2, in infecting *T. pratense* and soy-bean.

All the described varieties of subterranean clover grown in Australia are susceptible; eradication of perennial legumes, in which the virus may pass the summer, from the vicinity of clover is suggested as a possible means of control.

Turnbull (J.). **Orchard spraying for commercial growers.**—*'Growmore' Bull. Minist. Agric., Lond.*, 9, 14 pp., 5 figs., 1 diag., 1943.

Up-to-date information on the care and maintenance of spraying equipment and the management and methods of orchard treatment is presented with special emphasis on the modifications in ordinary routine practice necessitated by wartime conditions.

Hamilton (J. M.) & Weaver (L. O.). **Freezing preservation of fungi and fungus spores.**—*Phytopathology*, xxxiii, 7, pp. 612–613, 1 fig., 1943.

A new technique, involving quick-freezing and storage of the galls of *Gymnosporangium juniperi-virginianae* and the conidia of *Venturia inaequalis*, has been found at the New York (Geneva) Agricultural Experiment Station to provide a readily available source of inoculum throughout the year. Cedar galls, $\frac{3}{4}$ in. and upwards in diameter, with teleuto horns $\frac{1}{2}$ in. long when dry, are placed in paraffined Dixie cups, standing in vapour-proof metal containers, and held at a temperature of −10° C. Twelve hours after transference to room temperature, the galls are placed in a misty spray in preparation for spore discharge. Sporidia obtained from the frozen galls were found to be equally viable with those from field material. The teleutospores on galls kept at −10° for nine months functioned normally, and three spore discharges were obtained from a single gall refrozen after each discharge. Viable sporidia have been obtained 15 months after the first freezing of the cedar-apple rust galls. Sporidia in water suspension have been stored at −10° and −40°, but after three weeks an appreciable decline in viability supervenes.

In the case of *V. inaequalis* conidia it is necessary to line the cups with a layer of ice before the suspension is poured into them to prevent settling at the bottom, the inoculum being obtained by chipping a piece of ice from the block, defrosting, and diluting to an appropriate strength. Conidia frozen for over 15 months germinate excellently, but are more readily inhibited by fungicides than fresh ones. No damage to the spores resulted from freezing at −40°. The new procedure has worked equally well with *Sclerotinia fructicola* and F. Suit has successfully frozen the conidia of *Plasmopara viticola*.

Hamilton (J. M.), Palmiter (D. H.), & Mack (G. L.). **Particle size of sulphur and copper fungicides in relation to Apple scab and Cedar-Apple rust control.**—*Phytopathology*, xxxiii, 7, pp. 533–550, 3 figs., 1 graph, 1943.

The results of laboratory, greenhouse, and field tests carried out at the New York State Agricultural Experiment Station indicated that the fungicidal efficacy of ground wettable sulphurs and an insoluble copper fungicide is inversely proportional to particle size [*R.A.M.*, xxii, p. 260]. A wettable sulphur and the insoluble copper, ground to three degrees of fineness to include the range of particle sizes found in most commercial brands, were used in the tests, the sulphurs being tested in the field against apple scab (*Venturia inaequalis*), both sulphurs and copper in the greenhouse against rust (*Gymnosporangium juniperi-virginianae*), and on potted apples and in spore germination studies on brown rot (*Sclerotinia fructicola*). In trials with commercial wettable sulphur preparations, the toxicity was influenced not only by particle dimensions, but also by the presence of various adjuvants and by different methods of manufacture. Sulphur materials prepared by the Grinrod and flotation processes were relatively less adhesive than ground sulphur of equal particle size in the absence of an adjuvant.

The Andreasen sedimentation and air-permeation procedures for the computation of particle-size measurements [loc. cit.] were found to be the most reliable of the four methods tested for this purpose. The results of these determinations received further confirmation from photomicrographs of the particles, which

clearly demonstrate the presence of many more particles per unit area, for a given weight of material, in fine than in coarse dusts.

Hofferstead (S. L.), Goodwin (M. W.), & Kadow (K. J.). **Bitter rot of Apples and its control in Delaware.** *Bull. Del. agric. Exp. Sta.* 241, 23 pp., 2 graphs, 1943.

Bitter rot (*Glomerella cingulata*) is a serious problem in Delaware on certain susceptible apple varieties, such as Lily of Kent, Northwestern and Rhode Island Greenings, and Stark. The symptoms of the disease and the life-history of the pathogen are described in semi-popular terms. The results of control experiments covering the period from 1938 to 1940 yielded the following information. The removal of diseased and mummified fruits was inadequate as a means of eliminating infection and is not recommended. Spraying with Bordeaux mixture 4–4–100 should be started at the fourth or fifth cover and repeated at least once a fortnight; alternatively, the first two applications may be made with high concentrations and later ones with lower dosages. The copper load necessary to confer sufficient protection is about 200 microgm. per sq. in. of leaf surface, maintained throughout the season of activity of the fungus. Insoluble copper materials proved inferior to Bordeaux mixture in the control of *G. cingulata*, mostly by reason of their poor adhesive qualities, which were not improved by the admixture of spreader-stickers.

Björling (K.). **En kräftliknande sjukdom på Äppelträd, förorsakad av Myxosporium mali (Bres.).** [A canker-like disease of Apple trees caused by *Myxosporium mali* (Bres.).] – *Växtskyddsnotiser, Växtskyddsanst., Stockh.*, vii, 3, pp. 4–8, 5 figs., 1943.

*Myxosporium mali* [*R.A.M.*, vii, 699] was isolated in May, 1942, from sunken, yellowish-brown cankers on the branches of three-year-old apple trees from a nursery at Alnarp, Sweden, in one section of which 60 out of 252 were attacked, four being so extensively girdled that the branches above the site of invasion were killed. The discoloration was found to penetrate the bark to a depth of 1 to 2 mm., while alternating brown and black zones, 2 mm. in breadth, occupied the transitional area between the healthy and diseased portions of the branch. The elongated-oval, hyaline conidia of *M. mali* are considerably smaller than those of the related species, *M. corticola* [ibid., xv, pp. 260, 468], measuring 7 to 8 by 3μ. The results of some 30 inoculation tests on six trees showed the pathogen to be strictly dependent on a previous lowering of resistance in the host due to injury, e.g., by frost. The spread of the fungus in the diseased branches of the nursery trees was retarded, but not completely arrested, by scarification of the infected areas and bandaging the wounds with paper.

In the following April about 30 trees, including 15 Bramleys and 12 Ontarios, in the same nursery were also attacked by *M. mali*, and an examination of the root systems of three of the most severely damaged revealed coincident heavy infection by the crown gall organism (*Pseudomonas* [*Bacterium*] *tumefaciens*). The nurseryman stated that most of the East Malling II and IV stocks, used for grafting the Bramleys and Ontarios, respectively, were already affected by the bacterial disease at the time of planting. In this case, therefore, the impairment of vitality by *Bact. tumefaciens*, rather than any inherent varietal susceptibility, appears to have predisposed the trees to infection by *M. mali*.

Hildebrand (E. M.). **A latent virosis on Lombard Plum in New York.** – *Plant Dis. Reptr*, xxvi, 21, pp. 454–455, 1942. [Mimeographed.]

Five years after the removal of all trees affected with prune dwarf virus [*R.A.M.*, xxii, p. 31] from an Italian prune orchard containing two Lombard plum trees in

Niagara County, New York, the disease reappeared, on this occasion attacking also one of the Lombard trees. Following grafts from the other, presumably healthy, Lombard tree, severe necrotic spotting developed on the foliage of Italian prune and a milder condition on Bradshaw plum. A latent virosis on Lombard plum was also reported from Canada recently by Willison on p. 73 of the handbook on stone fruit virus diseases published by Hildebrand *et al.* [ibid., xxii, p. 142].

TINDALE (G. B.) & HUELIN (F. E.). **Bitter pit in Granny Smith Apples.** —*J. Dep. Agric. Vict.*, xli, 5, pp. 246–250, 2 figs., 1943.

Four years' studies in Victoria on the development of bitter pit [*R.A.M.*, xxii, p. 212] in Granny Smith apples during storage consistently demonstrated that the condition can be reduced to a minimum by late picking (about the end of April under local conditions) combined with immediate cool storage. In all four years immediate storage greatly reduced the disease, as compared with delayed storage. Control was usually much greater in the case of the final picking (about the end of April) than in the two earlier ones tested (about the end of March to middle of April). Maximum liability to pit was reached with quite short delays before storage. Further delay had no consistent effect in this respect, but prolonged delay certainly reduced storage life. This practice, commonly adopted in Victoria to reduce superficial scald in Granny Smith apples, should be abandoned. The evidence of one test indicated that coating the fruit by dipping it in an alcoholic solution containing 10 per cent. castor oil and 5 per cent. shellac may greatly reduce pit development [see above, p. 468]. Growing conditions appear to be as important a factor as maturity or delayed storage, and experiments on water supply control should be made.

DUNEGAN (J. C.). **Iron dimethyl dithiocarbamate—a possible substitute for Bordeaux mixture for the control of Apple blotch.**—*Plant Dis. Reptr*, xxvii, 3-4, p. 101, 1943. [Mimeographed.]

When Ben Davis apple trees in Arkansas were sprayed with ferric dimethyl dithiocarbamate [*R.A.M.*, xxi, p. 506] at the rate of 1½ lb. per 50 gals. for six consecutive applications, under 0·1 per cent. of the fruits developed blotch [*Phyllosticta solitaria*: ibid., xxi, p. 441] lesions, as compared with 40·8 per cent. for the unsprayed controls; 0·3 per cent. of the fruits on trees sprayed with Bordeaux mixture (2–4–50) were affected.

BLODGETT (E. C.). **Rasp leaf of Cherry.** —*Phytopathology*, xxxiii, 7, pp. 620–622, 1 fig., 1943.

The following conclusions have been reached on the basis of the writer's studies on cherry rasp leaf [*R.A.M.*, xxi, p. 378] in Idaho. The virus is readily transmissible by bud inoculation, its incubation period being only nine months, judging by the typical symptoms developing in May, 1942, in Mazzard seedlings and young Bing and Montmorency trees grafted in the previous August. There is reason to believe that the rasp leaf virus is unevenly distributed and moves rather slowly in the affected trees. The symptoms of the disease may appear on the leaves of terminal shoots of bud-inoculated mazzard seedlings. At the moment, rasp leaf is of no commercial importance in Idaho and has not been observed to spread naturally, but it exerts a potentially serious devitalizing influence on its host.

JEFFERS (W. F.). **Further progress in breeding Strawberries for resistance to red stele.**—*Trans. Peninsula hort. Soc.*, xxxii, 5, pp. 70–71, 1943.

When the 95 strawberry varieties previously selected for resistance to *Phytophthora fragariae* [*R.A.M.*, xxi, p. 421; xxii, p. 463] were experimentally inoculated by pouring zoospores on the roots, 57 of the selections developed infection. One

outstandingly resistant hybrid has been produced. It is a cross of Aberdeen by Fairfax, and fulfils all the requirements for a good commercial variety. This selection is early mid-season, very productive, forms firm, attractive, high-quality fruits, and makes clean vigorous plants.

**Blueberry diseases in Maine.**—*Bull. Me agric. Exp. Sta.* 419, pp. 395–417, 16 figs., 1943.

Much of the information given in this account of the present position regarding blueberry (*Vaccinium* spp.) diseases in Maine is based on the studies of Florence L. Markin, which were noticed at the time of publication from another source [*R.A.M.*, x, p. 532]. Generally speaking, the most important diseases at the moment are witches' broom (*Calyptospora columnaris*), leaf rust (*Pucciniastrum myrtilli*), and powdery mildew (*Microsphaera alni* var. *vaccinii*), less damage being caused by red leaf (*Exobasidium vaccinii*), shoot blight and fruit rot (*Sclerotinia* sp.), *Botrytis* blossom blight and fruit rot, brown leaf spot (*Septoria* sp.), and twig blight (*Diaporthe vaccinii*). The best control of these foliar diseases has been obtained by two applications of copper sulphate-lime dust (25 : 75), which may also be combined with tricalcium arsenate for the simultaneous control of insect pests in the following formulae: 20 per cent. copper sulphate, 17 per cent. tricalcium arsenate, and 63 per cent. lime, or 25, 17, and 58 per cent., respectively.

Crandall (B. S.). **Spread of Persimmon wilt.** *Plant Dis. Reptr.* xxvii, 7–8, pp. 158–160, 1 map, 1943. [Mimeographed.]

The results of a limited survey in North Carolina from 1940 to 1942 and along some 500 miles of highway in Florida and South Carolina in 1942 indicate that the wilt disease (*Cephalosporium* sp.) of persimmon (*Diospyros virginiana*) [*R.A.M.*, xix, p. 552] has spread into new territory in the Carolinas. Within its known range it has increased in regions where the host is abundant and decreased where it is scarce.

**Definition of fungicide terms.**—*Phytopathology*, xxxiii, 7, pp. 624–626, 1943.

Definitions approved by the Committee on Standardization of Fungicidal Tests, appointed by the American Phytopathological Society in 1939 [*R.A.M.*, xxii, p. 258 and next abstracts], are furnished for a number of terms used in the current literature on the testing of fungicides.

**The slide-germination method of evaluating protective fungicides.**—*Phytopathology*, xxxiii, 7, pp. 627–632, 1943.

Specifications approved by the Committee on Standardization of Fungicidal Tests of the American Phytopathological Society [see preceding and next abstracts] and believed to embody the most effective up-to-date procedures, are given for the apparatus, mode of application, standardization of the test fungus, examination for germination, comparisons, and determination of tenacity, to be employed in connexion with the slide-germination (moist chamber) method for the evaluation of protective fungicides.

**Standard laboratory Bordeaux mixture.**—*Phytopathology*, xxxiii, 7, pp. 633–634, 1943.

Directions are given for the preparation of standard laboratory Bordeaux mixture to fulfil the requirements of the Committee on Standardization of Fungicidal Tests of the American Phytopathological Society [see preceding abstracts]: the required deposition and LD values after mixture are specified and the method of determining its coefficient in relation to that of the test preparations is described.

KADOW (K. J.) & HOPPERSTEAD (S. L.). **An evaluation of new spray equipment.**—*Trans. Peninsula hort. Soc.*, xxxii, 5, pp. 13–18, 5 figs., 1943.

Notes are given on the construction and performance of some new types of fruit-spraying apparatus [cf. *R.A.M.*, xxii, pp. 166, 476], including G. W. Dougherty's 'new speed sprayer', based on the principle of distributing water suspensions of spray materials with air currents induced by a propeller and directed by fins, vertical booms, and a 12-nozzle boom devised by H. Heritage. The authors conclude that for satisfactory disease control by spraying there is no substitute for thoroughness and timeliness. The speed sprayer and the vertical boom appear to be steps in the right direction.

GASSNER (G.). **Zur Methodik der laboratoriumsmässigen Prüfung von Beizmitteln.** [A contribution to the technique of disinfectant trials under laboratory conditions.]—*Phytopath. Z.*, xiv, 4, pp. 303–309, 4 figs., 1943.

Nagel's method of testing fungicides for their toxicity to wheat bunt [*Tilletia caries* and *T. foetida*: *R.A.M.*, vii, p. 24] being open to criticism at one or two points, the writer proposes certain improvements in the technique, which now consists in placing the inoculated and treated seeds, embryo upwards, in a soil emulsion, where they are left until the completion of germination. Two to three days after the removal of the seeds the degree of reduction of spore germination on the submerged parts of the seed grains will give the measure of toxicity of the disinfectant. The data secured by this method in the laboratory corresponded with those obtained in simultaneous field trials. To cite some figures, entire freedom from infection in the field (spore germination totally inhibited in the laboratory or only one or two viable spores in the depressions of eight seeds) was conferred by abavit and fusariol at a dosage of 1 and 2 per cent., ceresan, germisan, and selektol at 2 per cent., abavit neu, germisan, and tillantin dusts at 200 gm., and panogen (oil) [cf. ibid., xxii, p. 164] at 200 c.c. per 100 kg. seed-grain. Very satisfactory control was also given by bigriol and higosan (2 per cent.), germisan 1 per cent., ceresan and germisan dusts (200 and 100 gm., respectively), and panogen (100 c.c.), with all of which the incidence of field infection was less than 1 per cent., and the number of spores germinating in the culture dishes negligible. The incidence of infection in the untreated control plot amounted to 53·2 per cent.

HANSEN (H. N.) & SNYDER (W. C.). **The dual phenomenon and sex in Hypomyces solani f. cucurbitae.**—*Amer. J. Bot.*, xxx, 6, pp. 419–422, 2 figs., 1943.

In continuation of their studies on the 'dual phenomenon' [*R.A.M.*, xvii, p. 830] the authors have examined many other fungi, especially species of *Fusarium*, and consider that the extraordinary genetic stability of the *M* type cultures constitutes strong evidence that *M* is a true mutant form from *C*. For *Hypomyces solani* f. *cucurbitae* [ibid., xxi, p. 224] the authors (abs. in *Phytopathology*, xxx, p. 787, 1940) have demonstrated that *M* and *C* types segregate in the normal 1 : 1 ratio. In further studies they show that the *C* haploid thalli of this fungus are hermaphroditic, self-sterile, and inter-fertile, whereas the *M* type has not been observed to produce sporodochia or perithecial primordia; it is assumed that the occurrence of sporodochia or primordia is determined either by a single gene or two genes located close to one another. As a result of hybridization experiments [which are described in detail] the authors conclude that the progeny of $AC \times aM$ (*A* and *a* being the two types of haploid thalli of this fungus which must be brought together to produce the sexual stage, and are sometimes referred to as compatibility groups) consist of four kinds of thalli *AC*, *AM*, *aC*, and *aM* in the normal ratio of 1 : 1 : 1 : 1. This behaviour is taken to indicate that the factors for *M* and *C* are allelomorphs and are inherited independently of the allelomorphic compatibility factors for *A* and *a*. By back-crossing the four thalli it was found

that *M* could function only as a male. It is concluded from these observations that the change of *C* to *M* is a true mutation, from the hermaphrodite to the unisexual male, and that sex and compatibility are distinct and independent characters. The authors propose the use of monoecious and dioecious for the thalli and reserve the terms homothallic and heterothallic for use only in connexion with the physiological character of compatibility. If this were done, a number of terms, e.g., sex heterothallism, physiological heterothallism, synoecism, haplosynoecism, would be reduced to synonymy.

Hamm (P.), Mitchell (J. E.), & Gottlieb (D.). **A reflector scale for measuring growth of fungi.**—*Phytopathology*, xxxiii, 7, pp. 619–620, 1 diag., 1943.

A reflector scale for the measurement of fungal growth in solid and liquid media consists of a panel of glass, scaled in millimetres, affixed to the top of a box-like apparatus, and a mirror at the base of the frame at an angle of 30°, which reflects the degree of development recorded on the panel. A movable, transparent ruler, inserted just below the panel, may be used if the glass is not ruled. A desk lamp placed above the instrument, so that its light shines through the plates placed right side up on the glass, facilitates the accurate measurement of colonies with very delicate mycelium and diffuse margins.

Wellman (F. L.). **A culture medium of Maize-meal and starch mush to replace agar for growing fungi.**—*Phytopathology*, xxxiii, 7, pp. 617–619, 1 fig., 1943.

The author has successfully employed a medium of maize meal and maize starch as a substitute for media based on agar, which is now difficult to obtain. Maize meal, 260 to 300 gm., is boiled with 1 l. water and cooked in a steam sterilizer for 10 minutes; to this is added 20 gm. maize starch stirred into 50 c.c. water. The mixture is poured into Petri dishes, which are covered and autoclaved. The same medium, thinned with 10 per cent. extra water, may be tubed; the tubes must be autoclaved and cooled in a slanting position.

Israilski (V. P.). Приобретенный Иммунитет у Растений. [Acquired immunity in plants.]—*Успехи современной Биологии. [Achievements of contemporary Biology]*, xv, 2, pp. 162–189, 1942.

The author presents a detailed critical review of the available knowledge on the problem of acquired immunity in plants [*R.A.M.*, xvii, p. 55], referring in particular to the work of Carbone [ibid., xi, p. 798], Cappelletti (*Ann. Bot., Roma*, xvii, pp. 1–87, 1928), and Magrou [*R.A.M.*, xvii, p. 799]. A bibliography of 86 titles is appended.

Fawns (H. T.). **Food production by micro-organisms. Part I. Protein production.** *Food Manuf.*, xviii, 6, pp. 194–198, 200, 1943.

The purpose of this series of articles is to indicate some of the main conclusions reached by microbiologists concerning the synthesis of proteins, fats, and vitamins by yeasts, moulds, and other micro-organisms. A useful survey is made of some recent noteworthy contributions to this aspect of microbic biochemistry.

Stanley (W. M.). **Viruses and the electron microscope.** *Chron. bot.*, vii, 7, pp. 291–294, 2 figs., 1943.

Reviewing recent investigations made into plant virus diseases by various workers with the aid of the electron microscope, the author states that this instrument appears to provide, for the first time, a means of directly determining the size and shape of every virus. It has confirmed the earlier, indirect evidence that the particles of tobacco mosaic virus are rods about 15 mμ in diameter and of various lengths. Tobacco necrosis virus has been shown to be spherical in shape

and about 22 mμ in diameter. A number of these instruments are now in use throughout the United States.

ATANASOFF (D.). **Virus diseases of plants: a bibliography. II Supplement.**—*Phytopath. Z.*, xii, 6, pp. 511–584, 1940.

This second supplement to the author's bibliography of the virus diseases of plants [cf. *R.A.M.*, xvii, p. 125] comprises a large number of recent additions to the relevant literature, arranged under 39 headings covering fundamental problems of the nature, structure, and properties of viruses, experimental technique, and the individual hosts of the various entities, author and general indexes being appended.

ROUTIEN (J. B.) & DAWSON (R. F.). **Some interrelationships of growth, salt absorption, respiration, and mycorrhizal development in Pinus echinata Mill.**—*Amer. J. Bot.*, xxx, 6, pp. 440–451, 2 graphs, 1943.

In a study conducted in Missouri under conditions of controlled supply and availability of soil-borne nutrients, the growth and salt absorption of seedlings of *Pinus echinata* and the respiration and fermentation rates of excised root fragments were investigated in relation to mycorrhiza [*R.A.M.*, xxii, p. 34]. It was found that substantial growth and salt uptake were possible at the higher levels of base saturation of the soil in the absence of mycorrhiza, provided that the physiological balance of the soil nutrients was maintained. The development of mycorrhiza enabled the seedlings to continue normal growth and salt absorption or even to surpass the normal rates in the presence of considerable amounts of adsorbed hydrogen-ion (up to 37 per cent. of the total base exchange capacity of the soil colloids), while the absence of mycorrhiza under these conditions usually depressed both growth and salt uptake. The presence of mycorrhiza was found to increase the average rate of aerobic carbon dioxide production of each short root from nearly two to four times the normal amount according to the degree of mycorrhizal development. A mechanism for fermentation was introduced with mycorrhiza formation which exhibited a definite oxygen inhibition and, therefore, stabilized the rate of carbon dioxide production by the short roots regardless of oxygen supply. No direct evidence was obtained to indicate whether mycorrhiza formation bears a causal relationship to increased salt absorption and the latter to growth, or whether the three phenomena are linked in some other manner. It is tentatively suggested, nevertheless, that the presence of mycorrhiza enables the plant to excrete hydrogen-ion for use in base exchange reactions with the soil colloids, and that the subsequent increased supply of nutrients and their absorption by the roots may later be reflected in a greater rate of growth.

DENNY (F. E.). **Suggestions on inducing early germination of Potato tubers in greenhouse tests for virus.**—*Amer. Potato J.*, xx, 7, pp. 171–176, 1943.

Detailed directions are given for the treatment at a temperature of 20° to 24° of dormant potato tubers with 38 to 40 per cent. ethylene chlorohydrin (16 hours' immersion in a solution of 30 c.c. per 970 c.c. water for cut and four days at a concentration of 1 c.c. per lb. for whole ones) to insure early germination and so facilitate the greenhouse testing of samples for virus diseases, which may be commenced with material stimulated by this means within a week or so of harvesting. In some cases, e.g., with small Irish Cobbler or Rural tubers, it is advisable to follow the ethylene chlorohydrin dip with one hour's immersion in sodium thiocyanate (10 gm. per l.). The cut-tuber method is also applicable to tubers in the later stages of dormancy (incomplete emergence). Recommendations are also made for the treatment of large quantities of whole tubers and for the labelling

of tubers and seed pieces with crystal violet ink, and a note is appended on the two strengths of ethylene chlorohydrin commercially available.

Younkin (S. G.). **Purple-top wilt of Potatoes caused by the Aster yellows virus.**—*Amer. Potato J.*, xx, 7, pp. 177–183, 1943.

The writer describes fully his experiments on the transmission of the aster yellows virus by *Macrosteles divisus* from *Ambrosia artemisiifolia* to potato, on which it induces purple-top wilt symptoms, a preliminary account of which has already been noticed [*R.A.M.*, xxii, p. 269].

Bonde (R.) & Schultz (E. S.). **Potato cull piles as a source of late-blight infection.**—*Amer. Potato J.*, xx, 5, pp. 112–118, 1943.

The information in this paper on the importance of potato refuse piles in the dissemination of late blight [*Phytophthora infestans*] in Maine has already been noticed from another source [*R.A.M.*, xxii, p. 400].

Gardner (M. W.) & Yarwood (C. E.). **Phytophthora infestans on the weed Solanum sarachoides.** *Plant Dis. Reptr*, xxvi, 23, pp. 501–502, 1942. [Mimeographed.]

Leaf and stem infections of *Phytophthora infestans* were observed on *Solanum sarachoides* localized round volunteer potato plants showing late blight on a farm near Colma, California. In culture, mycelial growth and sporulation were typical of *P. infestans* from potato. The weed in question has previously been referred to *S. villosum*.

Miller (R. W. R.). **Annual Report, Department of Agriculture, Tanganyika Territory, 1942.**—7 pp., 1943.

On p. 6 of this report it is stated that during 1942, potatoes in the Moshi, Arusha, and Mbulu districts of Tanganyika Territory were severely attacked by late blight [*Phytophthora infestans*], other areas being as yet, apparently, unaffected.

Dowson (W. J.). **Spore-forming bacteria in Potatoes.**—*Nature, Lond.*, clii, 3855, p. 331, 1943.

An organism, tentatively identified by T. Gibson of Edinburgh as *Bacillus polymyxa* (Prazmowski) Migula, was responsible for the conversion of the interior of stored potato tubers into a gummy, transparent mass, the material examined by the writer being taken from a consignment submitted for inspection by the Ministry of Agriculture. On inoculation into fresh slices of potato, carrot, onion, cucumber, and iris stems, the bacterium induces complete decay, accompanied by abundant evolution of gas; on reisolation it was again inoculated into a further series of slices with similar results, the process being repeated several times at varying temperatures from that of the room to 37° C. Evidently this normal occupant of the soil is capable of pathogenicity to plants under conditions requiring closer investigation.

Livingston (J. E.). **The present status of bacterial ring rot.** *Rep. Neb. Potato Imp. Ass.* 23, pp. 9–12, 1942.

Difficulty is occasionally experienced in the differentiation of tubers attacked by *Corynebacterium sepedonicum* from those harbouring the agent of wilt *Fusarium* [*F. solani* var. *eumartii*: *R.A.M.*, xxii, p. 448], but the two diseases may be distinguished by the following features. The discoloured ring caused by ring rot extends much further into the tuber than that produced by wilt, which seldom penetrates more than half way, if as far, while the former is unaccompanied by the water-soaking which is characteristic of the latter. The ring-rot discoloration is creamy or

lemon-yellow in contrast to the darker brown of wilt, while *F. solani* var. *eumartii* does not form the circular to irregular rotted pockets, the size of a pea or larger, of a creamy or cheesy consistency, which are found in the vascular ring and sometimes in the other tissues of tubers invaded by *C. sepedonicum*.

Formaldehyde or hypochlorite solutions have been found satisfactory for the disinfection of equipment and cellars, while sacks should be immersed in a vat of boiling water for ten minutes or steamed in a closed container. Nebraska growers are urged to aim at the complete elimination of the ring-rot pathogen from their seed stocks. So far the State, in which the incidence of infestation is comparatively low, has not had a single car-load of potatoes rejected on account of the disease.

Weber (G. F.). **Southern blight, Corticium rolfsii, of Potato tubers.**—*Phytopathology*, xxxiii, 7, pp. 615–617, 1 fig., 1943.

Although frequent reference has been made to the occurrence of southern blight (*Corticium rolfsii*) on potato tubers in Florida and elsewhere in the south-eastern United States, the published information on the disease is so scanty that a description of the symptoms was deemed advisable. Sebago tubers harvested near Gainesville in late May, 1942, showed about 1 per cent. infection, manifested by sunken, circular, yellow to tan spots, with diffuse, brownish margins and a central speck, apparently a lenticel, 1 cm. in diameter, gradually darkening with the development of secondary organisms on the surface. The cortex surrounding the lesions was often overgrown by a thin, more or less reticulate hyphal weft closely adpressed to the surface. In advanced stages of the disease, portions of the tubers collapsed, the resultant soft areas usually being covered by cortex, which finally ruptured to disclose small, spherical, clustered, white to dark brown sclerotia. The internal enlargement of the lesions was accompanied by a complete loss of firmness of the flesh, which assumed a chalky-white, opaque appearance and a cheesy consistency. Desiccation, shrinkage, and collapse followed, the white mycelium and usually the sclerotia of the pathogen developing in the cavities thus induced.

A sufficiency of soil moisture is the decisive factor in the growth of *C. rolfsii*, and as the supply becomes depleted in dry weather, the level of the fungus apparently shifts from the surface of the dry, sandy local soils to the deeper layers, so that the tubers are exposed to infection instead of the stem and aerial organs, which suffer in normal seasons.

Jaarsveld (Alida). **Der Einfluss verschiedener Bodenpilze auf die Virulenz von Rhizoctonia solani Kühn.** [The influence of various soil fungi on the virulence of *Rhizoctonia solani* Kühn.] —*Phytopath. Z.*, xiv, 1, pp. 1–75, 11 figs., 15 graphs, 1942.

Some of the writer's exhaustive, fully tabulated studies on the influence of various soil fungi on the pathogenicity of *Rhizoctonia* [*Corticium*] *solani* to Lungbok Chinese cabbage seedlings were carried out at the Willie Commelin Scholten Phytopathological Laboratory, Baarn, Holland, and the remainder at the Federal Technical College, Zürich, Switzerland. Ten strains of *C. solani* were used in preliminary experiments, of which six were newly isolated (four from potato and two from coffee seedlings and *Cinchona*, respectively); the remainder, including the one isolated by Van Luijk in 1931 from grass seed [*R.A.M.*, xiv, p. 240] and used in the majority of the present trials on account of its extreme virulence, and the non-parasitic soil fungi were obtained from the Centraalbureau voor Schimmelcultures, Baarn.

Previous investigations on the subject of the work are reviewed, the validity of most of the results being regarded as questionable owing to the alleged omission

of precautions to ensure completely sterile experimental conditions, which were provided in the writer's tests by the use of culture tubes sealed with plugs of cotton wool. The strongest antagonistic effect on sterilized sand or soil cultures of *C. solani* was exerted by two strains of *Trichoderma lignorum* [*T. viride*; ibid., xvi, p. 556], followed by *Pyronema confluens*, *Cylindrocarpon didymum*, *Penicillium expansum*, *Cladosporium herbarum*, and *Absidia spinosa*. In combinations of *Corticium solani* with two to four of its antagonists, the total inhibitory effect on the pathogen was greater than that produced by one alone. The inclusion of *Cylindrocarpon didymum* with other soil fungi mitigated the action of the latter, notwithstanding its independent antagonism to the parasite. The results of pot experiments generally confirmed those of the laboratory tests.

The antagonistic effects of *A. spinosa*, *C. didymum*, *Pyronema confluens*, and strain B of *T. viride* reached a climax at temperatures approaching the optimum for the development of the individual fungi, i.e., 24° C., 21°, 27°, and 21° to 33° on solid media, and 27°, 24°, 21° to 30°, and 15° to 30° on liquid media. The cabbage seedlings made good growth between 9° and 30°.

Not only the living soil fungi, but also their filtrates, exercised an adverse influence on the growth of *Corticium solani* and weakened its pathogenicity to the cabbage seedlings. As a rule, no pseudosclerotia developed in undiluted, only a few in weakly diluted, and many in strongly diluted filtrates.

In combined cultures of *C. solani* and the various soil fungi mutual aversion assumed several forms, but no case of hyperparasitism was observed.

Mujica (F.). **Susceptibilidad de variedades de Papas a la sarna polvorienta causada por la Spongospora subterranea (Wallr.) John.** [Varietal susceptibility of Potatoes to the powdery scab caused by *Spongospora subterranea* (Wallr.) John.]—*Bol. Sanid. veg., Santiago*, ii, 1, pp. 17–19, 1942.

In a trial of 51 potato varieties for their reaction to powdery scab (*Spongospora subterranea*), the six most resistant were Huevo Los Riscos, Chapeda Colorada, Mantequilla Los Riscos, Huevo Chiloé, Industrie, and Volcán, with 0, 0, 0, 0·82, 4·50, and 5·63 per cent. infection, respectively, compared with an incidence of up to 60·28 per cent. in the remainder.

Sorensen (H. G.). **Crown budding for healthy Hevea.** *Agric. Amer.*, ii, 10, pp. 191–193, 5 figs., 1942.

An outstanding feature of the co-operative Western Hemisphere programme for the establishment of a plantation rubber industry in Latin America, undertaken in 1940, was an energetic campaign against the destructive and hitherto uncontrollable leaf blight (*Dothidella ulei*) [*R.A.M.*, xx, p. 223]. Many resistant individuals exist in nature, but as a rule such trees are poor yielders, and the ultimate objective of the plant-breeders concerned with this problem is the development of clones or strains combining the capacity to withstand infection by *D. ulei* with heavy cropping. This has been partly accomplished; in the meantime a promising method of using eastern strains is the bud-grafting of resistant crowns on to a selected trunk originating from a bud of a high-yielding stock affixed to a seedling. The outcome of this combination is a tripartite tree, consisting of a root, a trunk, and a crown all derived in the first instance from different seeds. Similar experiments have been conducted [in Java] with a view to the control of mildew (*Oidium heveae*) [ibid., viii, p. 464]. Most of the 53 Far Eastern clones imported into Brazil in 1934 by the Ford Company, which initiated the Latin-American rubber scheme in 1929, proved to be highly susceptible to blight, as also did the Tapajoz River (Amazon Valley) seedlings used, together with some highly resistant individuals from Belém and Acre, for the first plantings. This resistant material provided selections which are now being rapidly multiplied both for planting and crown-

budding. Some of the early crown-budding experiments were made with *Hevea guianensis*, *H. spruceana*, and other species, but it is now considered safer to use only *H. brasiliensis* for top-working so as to avoid any deterioration in the quality of the latex.

Campbell (W. A.), Leach (L. D.), Presley (J. T.), & Snyder (W. C.). **Some diseases of Guayule in California.**—*Plant Dis. Reptr*, xxvii, 2, pp. 63–66, 1943. [Mimeographed.]

Nursery and field plantings of guayule (*Parthenium argentatum*), now being extensively cultivated in California for the production of rubber, have shown the presence of root rots (one type associated with *Phytophthora* sp., another with *Pythium* sp. and a third with a *Rhizoctonia* of the *R.* [*Corticium*] *solani* type), wilt (*Verticillium albo-atrum*), top rot (*Sclerotinia sclerotiorum*, *S. minor*, and *Botrytis cinerea*), and collar rot (? *Phoma* sp.). Most of these organisms are favoured by wet conditions, and would probably be of little or no importance to guayule in its natural desert habitat.

Ezekiel (W. N.). **Crown rot and root rot of Guayule.**—*Plant Dis. Reptr*, xxvii, 1 pp. 2–8, 1 map, 1943. [Mimeographed.]

Experimental plantings of *Parthenium argentatum* in Texas were attacked by a form of crown rot, the cause of which was not ascertained, and by root rot (*Phymatotrichum omnivorum*), but not by rust (*Puccinia parthenii*), previously recorded in North America. The crown rot occurred in two out of four fields and caused heavy loss. It appeared to be, primarily, a disease affecting large, vigorously growing plants. The injury was found to centre round the crown, where the cortex and deeper tissues were blackened and decayed. Individual shoots, rather than the whole plant, appeared to be attacked separately at the crown. Many plants displayed growth cracks about the enlarged crown.

In a one-acre planting, plants eight to nine months old were found attacked by *Phymatotrichum omnivorum*, the dead plants occurring in groups of one to four along the rows. Rather less than a month later, about 6 per cent. of the plants were observed to be dead, the general appearance agreeing with a diagnosis of *P. omnivorum* root rot. This appears to be the only record of this fungus on guayule under field conditions. In inoculation tests under conditions strongly favouring infection nearly one-half the young plants inoculated succumbed.

Streets (R. B.). **The susceptibility of Guayule to Phymatotrichum root rot.**—*Plant Dis. Reptr*, xxvii, 2, pp. 66–68, 1943. [Mimeographed.]

In a test carried out in southern Arizona, some 10,000 guayule (*Parthenium argentatum*) plants were set in an area of about 1½ acres. Two-thirds of plot 1, previously planted to cotton, was heavily infected by *Phymatotrichum* [*omnivorum*: see preceding abstract], one-third of plot 2, previously planted to lucerne, was very heavily infected by the same fungus, and the remainder was free from the root rot. The soil was a light sandy loam. The one-year-old seedlings were planted on 17th and 18th April, and irrigated at once, after which they received a light irrigation every seven to ten days for six weeks. Until second-year data become available growers are advised not to plant this host on irrigated lands known to be infected with the fungus.

Niethammer (Anneliese). **Ernährungsphysiologische Untersuchungen an Fusarien, unter Hervorhebung der Ölspeicherung.** [Nutritional-physiological studies on *Fusaria*, with emphasis on oil secretion.] *Arch. Mikrobiol.*, xiii, 2, pp. 140–149, 1 fig., 1942.

Continuing her studies at the German Technical College, Prague, Czecho-

slovakia, on species of *Fusarium* isolated from various types of soil [*R.A.M.*, xxii, p. 406], the writer describes the cultural characters, with special reference to oil secretion, on ten nutrient media of *F. sambucinum*, *F. bulbigenum* and its vars. *blasticola* and *tracheiphilum*, *F. solani* and its var. *martii*, and *F. oxysporum* and its var. *aurantiacum*. Natural cellulose containing plant remains, such as pea and bean straw and potato foliage, were particularly suitable as substrata. On all the media tested heavy deposits of oil were observed in the hyphae, and frequently also in the conidia and chlamydospores, of the species under investigation.

Perotti (R.). **Gli studi italiani sul fondamento dell' impiego del boro in agricoltura.** [Italian studies on the basis of the use of boron in agriculture.] *Phytopath. Z.*, xii, 4, pp. 421–424, 1940. [German summary.]

Italian investigations on the uses of boron in agriculture are briefly discussed, with special reference to those conducted at the Pisa Phytopathological Institute, near which (at Larderello) is the most important source of boron in the world. The researches relate to the presence of boron in the soil and in plant tissues, the action of the element on the soil microflora and higher plants, and in particular to its application as a fertilizer and chemotherapeutant.

Katznelson (H.) & Richardson (L. T.). **The microflora of the rhizosphere of Tomato plants in relation to soil sterilization.** *Canad. J. Res.*, Sect. C, xxi, 8, pp. 249–255, 1943.

In qualitative and quantitative studies of the soil and root microflora of greenhouse tomatoes, carried out at the Dominion Laboratory of Plant Pathology, St. Catherines, Ontario, examination of samples from soils sterilized with formaldehyde, chloropicrin, or steam, and of the unsterilized control, invariably showed greater numbers of fungi, bacteria, and Actinomycetes in rhizospheres than in soils apart from the root. Sterilization with chloropicrin and formaldehyde resulted in large increases in numbers of fungi in both rhizospheres and soils, but steam had a deleterious effect lasting for over three months. Bacteria were considerably more numerous on infected than on healthy roots. There was a definite tendency for bacteria with simple food requirements and those stimulated by amino acids to predominate in the rhizospheres, and for those with more complex nutritional needs to predominate in other parts of the soil.

Conners (I. L.). **Rusts and other diseases of Safflower.** *Plant Dis. Reptr.*, xxvii, 9, pp. 194–199, 1943. [Mimeographed.]

In this paper, reprinted from a mimeographed unnumbered publication issued by Central Experimental Farm, Ottawa, 10th March, 1943, the author deals with rusts of safflower (*Carthamus tinctorius*) of which only one, *Puccinia carthami* [*R.A.M.*, xxi, p. 495], has been found in Canada (in Manitoba and Saskatchewan, 1942). An annotated list is also given of the diseases of the crop previously noted in this *Review*, together with *Gloeosporium carthami* [syn. *Marssonia carthami*: *Mycologia*, xii, p. 333, 1920] from Japan and the United States.

Rayss (T.). **On some lower fungi of Palestine.** *Palest. J. Bot.*, J Ser., ii, 4, pp. 247–249, 2 figs., 1942.

This further critically annotated contribution to the mycoflora of Palestine [*R.A.M.*, xx, p. 495] comprises seven species, two of which are new. Mention may be made of *Uropblyctis alfalfae* on a new host, *Medicago rotata* [cf. ibid., xvi, p. 563], and of the detection of *U. pulposa*, a destructive parasite of cultivated beets [ibid., x, p. 7], on the leaves, stems, and petioles of wild beet along the irrigation ditches in a clover field. Since the weed may serve to perpetuate the

pathogen from year to year, it should be eradicated from the vicinity of cultivated plantings.

CUMMINS (G. B.). **Annotated check list and host index of the rusts of Guatemala.**—*Plant Dis. Reptr. Suppl.* 142, pp. 79-131, 1 map, 1943. [Mimeographed.]

Of the 1,858 collections of Guatemalan rusts, comprising 369 species, enumerated in the present list on 611 hosts, P. C. Standley was responsible for 742 (1939 to 1941), E. W. D. Holway for 600 (1914 to 1917), Kellerman for 243 (1905 to 1908), and J. R. Johnston for 224 (1937 to 1941). *Puccinia antirrhini* (a new record) is stated to be extending its distribution wherever *Antirrhinum majus* is grown.

COOKE (W. B.). **Additions to the host index of fungi of Mount Shasta, California—II.**—*Plant Dis. Reptr.* xxvi, 11, pp. 253–259, 1942. [Mimeographed.]

Several more records, and one correction to the first list, are contained in this addition to the author's host index of fungi of Mount Shasta, California [*R.A.M.*, xx, p. 323].

HILLS (PATRICIA L.). **The mycelium of the Uredinales.**—*Amer. Midl. Nat.*, xxviii, 3, pp. 756–760, 5 figs., 1943.

The examination at the State University of Iowa of five species of rusts, namely, *Pucciniastum agrimoniae* from *Agrimonia gryposepala*, *Coleosporium solidaginis* from *Solidago canadensis*, *Melampsora medusae* from poplar (*Populus deltoides*), *Tranzschelia* [*Puccinia*] *pruni-spinosae* from *Prunus serotina*, and *Puccinia malvacearum* from hollyhock revealed the presence in all of structures analogous to those described by Voss (*Ber. dtsch. bot. Ges.*, xxi, pp. 366–371, 1903) as clamp-connexions. However, in the light of more recent knowledge concerning anastomoses, the elements in question are interpreted as small hyphal loops or incompletely formed septa.

GADD (C. H.). **Shot-hole borer and wood rot.**—*Tea Quart.*, xvi, 1, pp. 6–9, 1943.

After stating that the discoloration of the woody parts of the tea bush in which the shot-hole borer *Xyleborus fornicatus fornicatior* makes its galleries is sometimes interpreted as the beginning of wood rot [cf. *R.A.M.*, xv, p. 747], and distinguishing between this condition, which is a penetration into the living wood, and die-back, which seldom extends below the uppermost new growth, the author describes an experiment made to ascertain whether the amount of rot developing in a given time after pruning is greater in borer-infested than in non-infested branches. In three fields in the Passara district, the mean length of die-back in 35, 50, and 50 pruned infested stems was, respectively, 0·76, 0·99, and 0·75 in., while in pruned uninfested stems it was 0·41, 0·54, and 0·27 in., respectively. The mean length of wood rot in pruned infested stems was, respectively, 1·1, 0·22, and 0·65 in., while in the uninfested it was, respectively, 0·63, 0·12, and 0·33 in. The shot-hole borer frequently enters the stem at the leaf scar and thereby damages the bud above, preventing it breaking after pruning; this results, as the experimental data show, in greater die-back. It also appears that the wood surrounding the galleries is either rendered more susceptible to attack by wood-rotting fungi or can be reduced more rapidly by such organisms to a friable condition than wood free from borer attack.

BOND (T. E. T.). **Deficiency diseases and the role of the 'minor elements' in plant life.**—*Tea Quart.*, xvi, 1, pp. 9–15, 1943.

In this discussion of the part played by the so-called minor elements in plant nutrition the author discusses those which have been shown to be essential, the quantities of them that plants require, their availability in the soil, and the

diagnosis and cure of diseases due to a deficiency of them. Reference is made in this connexion to tea yellows in Nyasaland, caused by sulphur deficiency [*R.A.M.*, xii, p. 537], and to other deficiency diseases of the same host in Java [ibid., xx, p. 497].

Price (W. C.) & Spencer (E. L.). **Accuracy of the local lesion method for measuring virus activity. II. Tobacco-necrosis, Alfalfa-mosaic, and Tobacco-ringspot viruses.**—*Amer. J. Bot.*, xxx, 5, pp. 340–346, 1943.

This paper gives more results of the writers' virus activity-measuring experiments [*R.A.M.*, xxii, p. 376]. When the solution tested was from 25 to 100 per cent. of the standard virus preparation, the mean (and greatest) errors were 11 (and 32) per cent. for tobacco necrosis virus, 18 (40) per cent. for lucerne mosaic virus, and 14 (36) per cent. for tobacco ring-spot virus.

Price (W. C.). **Severity of curly top in Tobaccos affected by site of inoculation.** *Phytopathology*, xxxiii, 7, pp. 586–601, 1 fig., 1943.

The symptoms developing on Turkish tobacco grafted with scions from tobacco plants recently infected by the sugar beet curly top virus ranged from mild through intermediate to severe, and similar results were obtained in experiments with scions from tobacco plants that had recovered from the disease. In general, the symptoms were rather more severe in the case of recently infected than in that of recovered plants, but the differences were not consistent. Tomato plants grafted with scions from recovered tobacco either contracted severe curly top symptoms, usually culminating in death, or showed no sign of infection (15 out of 44), the latter result being attributable to failure of the virus to pass the graft union or reach the growing points of the grafted plant.

The intensity of the symptoms developing in tobacco plants into which the curly top virus was introduced through the vector, *Eutettix tenellus*, depended in part on the portion of the plant utilized for the insect's food supply, severe infection following contact with carriers fed on tissues near the growing point, in contrast to the mild or moderate manifestations produced by insects confined to single leaves or areas of the stem well below the growing point. Transmission of curly top to old tissues by *E. tenellus* was thus comparable to the same process effected by grafting with scions from recently diseased or recovered tobacco plants. These results are considered to throw doubt on the supposed transmission of protective substances through the graft union [*R.A.M.*, xix, p. 304].

McKinney (H. H.). **Reaction of resistant Tobaccos to certain strains of Nicotiana virus 1 and other viruses.**—*Phytopathology*, xxxiii, 7, pp. 551–568, 3 figs., 3 diags., 1943.

When viruses of the yellow mosaic mutants were inoculated into the T.I. 448A tobacco selection [*R.A.M.*, xxii, p. 376], secondary chlorotic spots seldom appeared in the new leaves until they had attained a quarter to half their growth. The first symptoms usually develop at or near the leaf tip, the spotting proceeding downwards as the leaf grows. The spread of chlorosis from the initial foci tends to reach its maximum concentration in the leaf margins and apex and is not correlated with the rate of cell division, which is slower towards the tip than in the lower margins. From the available evidence it appears safe to conclude that the secondary chlorotic spots in T.I. 448A and Ambalema are a sequel to the destruction of the chlorophyll rather than to the prevention of chlorophyll synthesis. The mosaic pattern produced by the yellow mutants on dark green varieties is usually less permanent than that developing on the foliage infected by common mosaic, the former undergoing modifications coinciding with the advance of delayed chlorosis into the green zones. None of the mutants from the

common mosaic virus were more active invaders of tobacco leaves than the parent, and some, in fact, seemed less efficient in this respect. T.I. 448A contracted neither local nor systemic necrosis on infection by *Nicotiana* virus 1 or any of its mutants, while on Ambalema no systemic necrosis occurred and the minute necrotic lesions were localized.

In comparative experiments with the mutants *BSY* [ibid., xxi, p. 268], type B [ibid., xv, p. 322], and the 'white' virus collected by W. D. Valleau in the field [ibid., xx, p. 499] on T.I. 448A and *N. glauca*, the exact order of pathogenicity of the different strains for one host is not reflected in the other, nor does the latter react uniformly to various collections of the light green mosaic viruses falling within the common mosaic group. It is thus apparent that a single virus strain cannot serve to indicate the precise composition of the genes conferring resistance to mosaic in plants possessing this property. Plants of T.I. 448A and Ambalema infected with *Nicotiana* virus 1 have never shown yellow mosaic mutation spots, and since *Nicotiana* virus 1 appears to interfere with the unlimited increase and spread of its mutants, it is highly probable that these resistant tobaccos are very poor natural reservoirs for the mutants. Should mutants arise that suppress *Nicotiana* virus 1, difficulties may be encountered with all resistant tobaccos now in use.

It is concluded from the results of these and previous studies that T.I. 448A is one of the best genotypes, if not unequalled, among those at present available for use in breeding for resistance to the common mosaic virus and its variants.

Reynard (G. B.). **'Red ring' of Tomato stems caused by an insect, Cyrtopeltis varians (Dist.), at Charleston, S.C.**—*Phytopathology*, xxxiii, 7, pp. 613–615, 1 fig., 1943.

Attention is drawn to the implication of a bug, *Cyrtopeltis varians*, in the etiology of 'red ring' of tomato stems and petioles at Charleston, South Carolina, in 1941 and 1942, a similar injury having also been reported from Texas and Arizona. The stems and petioles of the upper branches of the plants were encircled by reddish-brown, raised marks and often collapsed on bending. The symptoms are suggestive of a disease of which it is thought possible the insects may be vectors.

Linn (M. B.) & Anderson (H. W.). **Spread of the common Tobacco-mosaic virus in Tomato fields by means of vine lifters.**—*Plant Dis. Reptr*, xxvi, 22, p. 470, 1942. [Mimeographed.]

During tomato dusting operations against blight (*Septoria*) [*lycopersici*], the use of vine-lifters on the dusting equipment appeared to be responsible for an unusual amount of mosaic. No virus apart from the tobacco mosaic virus, typical strain, was present. Some 5 per cent. of the plants, it was estimated, showed mosaic at the time of the first dusting. At the first picking an average of 95 per cent. of the plants in the dusted, and 43 per cent. in the undusted, rows showed the condition. It would appear that under certain circumstances, the use of vine-lifters may result in such severe mosaic infection as to nullify any benefits from the use of the lifters and even from the dusting.

Samson (R. W.). **Single-virus streak of greenhouse Tomatoes.**—*Plant Dis. Reptr*, xxvi, 16, pp. 361–364, 1942. [Mimeographed.]

In May, 1942, greenhouse tomatoes at Indianapolis, Indiana, were observed to be affected by a disease resembling streak [see next abstract]. From a trace to 20 per cent. of the plants showed necrotic streaking of the upper portions of the stems and of the petioles and major leaf veins of the adjacent leaves. Brown, necrotic areas were present in the pith of the streaked stems. Many more plants showed only a limited amount of leaf and petiole necrosis in addition to sharply

defined bleached or chlorotic areas. Traces of leaf necrosis were found on plants otherwise showing only a mosaic mottling. Almost all plants showed mosaic mottling on the younger leaves. Some of the affected plants bore distorted fruits showing depressed, corky spots and broad streaks.

Observations made a month or so before indicated that the necrotic phase was more severe when the plants were young, with only two or three clusters of fruit set, and rapidly growing. This stage had coincided with fewer hours of sunlight and lower greenhouse temperature. With better weather, additional fruit set, maturity of the first fruits, and narrowing, apparently, of the carbon–nitrogen ratio in the plants, the development of additional necrosis became arrested, and later growth showed only mosaic symptoms.

These symptoms led the author to conclude that the disease was single virus streak, a view which preliminary inoculation experiments appeared to confirm. Young tomato plants inoculated with unheated extracts from 37 affected plants all developed mosaic mottling, in most cases accompanied by yellow mottling. Only two of 222 tomato plants developed any necrosis. Turkish tobacco plants inoculated with unheated extracts from 15 of the 37 collections developed a very characteristic disease, in the form of extensive necrosis of the inoculated leaves, indefinite chlorosis and necrotic flecking of the next younger leaves, and mottling of the still younger ones. This condition resembled that produced on the same host by the virus from *Plantago* [*lanceolata*: *R.A.M.*, xxi, p. 227]. Turkish tobacco plants inoculated with 18 of the remaining collections developed a disease closely resembling common tobacco mosaic. The four remaining collections gave rise to local, necrotic lesions and a systemic tobacco-mosaic type of mottling without necrosis.

The writer tentatively concludes that at least two viruses were present in the 37 collections, both being strains of tobacco mosaic virus and that both were present in some of the tomato plants. The paper concludes with suggestions on control.

Linn (M. B.) & Anderson (H. W.). **A single-virus streak disease of greenhouse Tomatoes in Illinois.** – *Plant Dis. Reptr.*, xxvi, 21, pp. 452–454, 1942. [Mimeographed.]

In May, 1942, some 90 per cent. of the tomatoes in a greenhouse near Kankakee, Illinois, were reported to be affected with a virus disease, resembling one described by Samson on greenhouse tomatoes in Indiana [see preceding abstract] as caused by a single-virus streak strain of tobacco mosaic, except that, in the case of the Illinois disease, the fruits appeared to remain unaffected. The affected plants from Illinois showed faint, necrotic streaks on the upper stems, petioles, and leaf veins, which were associated with a yellowing or bleaching mosaic pattern, this last being the most conspicuous symptom. The disease reappeared in September, affecting nearly all the tomatoes of the autumn planting, in spite of the fact that the soil had been steam-sterilized and no other plants had been grown in it between the tomato crops.

In tests carried out with juice from affected plants, diluted 1 : 1 with water and exposed for 10 minutes to temperatures ranging from 45° to 85° C. at 10° intervals, young tomato plants were inoculated, other plants being inoculated with juice not exposed to heat. All the inoculated plants showed yellow mottling within 10 days, and there was no appreciable difference between the symptoms produced by the heated and the unheated extracts.

When tomato plants inoculated with untreated juice were transplanted to the field three weeks after mottling had developed, necrotic streaking appeared on the leaves and stems in two or three weeks, but the fruits remained normal.

Alexander (L. J.) & Lincoln (R. E.). **A survey of the genus Lycopersicon for resistance to the important Tomato diseases occurring in Ohio and Indiana.** — *Plant Dis. Reptr. Suppl.* 136, pp. 51–85, 1942. [Mimeographed.]

The results of tests on the reactions of 448 tomato introductions of the Bureau of Plant Industry, United States Department of Agriculture, to the principal diseases affecting the crop in the north-central region of the United States are discussed and presented in tabular form. Of the five species of *Lycopersicum* constituting the experimental material, *L. peruvianum* provided the most valuable source of resistant selections, particularly as regards tobacco mosaic and leaf mould (*Cladosporium fulvum*), some of the lines being also able to withstand infection by *Fusarium bulbigenum* var. *lycopersici*, *Septoria lycopersici*, *Alternaria solani*, and *Phytomonas* [*Xanthomonas*] *vesicatoria*. A high degree of resistance, approximating to immunity in many cases, to mosaic and the defoliation diseases was shown by *L. hirsutum*, while *L. pimpinellifolium* sustained little damage from *F. bulbigenum* var. *lycopersici* or *C. fulvum*. Only a few lines of *L. esculentum* showed any promise from the standpoint of breeding for resistance to the major diseases, though both this species and *L. pimpinellifolium* gave some indication of freedom from ripe fruit rot (*Colletotrichum phomoides*). None of the introductions was conspicuously resistant to *P. michiganensis* [*Corynebacterium michiganense*] or *P.* [*Bacterium*] *solanacearum*.

Doolittle (S. P.). **Tomato diseases.** *Farmers' Bull. U.S. Dep. Agric.* 1934, 83 pp., 47 figs., 1 map, 1943.

Semi-popular notes are given on the bacterial, fungal, virus, non-parasitic, and miscellaneous diseases affecting United States tomato crops, which in 1940 occupied over 600,000 acres of an estimated value of $56,000,000, with recommendations for their control and a key to facilitate diagnosis.

Leach (J. G.) & Berg (A.). **Tomato tip-blight found in West Virginia.** — *Plant Dis. Reptr*, xxvi, 12–13, p. 278, 1942. [Mimeographed.]

Woods (M. W.) & Cox (C. E.). **A virus disease of Tomato, new to Maryland, that resembles tip-blight.** — *Trans. Peninsula hort. Soc.*, xxxii, 5, pp. 69–70, 1943.

Both these papers record tomato tip blight [*R.A.M.*, xviii, p. 420], caused by a strain of the tomato spotted wilt virus, from West Virginia, and, according to the second, probably from Maryland also. These are the first records of the disease from the eastern regions of the United States.

Cass Smith (W. P.). **Wilt diseases of Tomatoes.** — *J. Dep. Agric. W. Aust.*, Ser. 2, xxi, 1, pp. 45–53, 6 figs., 1943.

Tomato spotted wilt was first recorded in Western Australia in 1923, when it was observed in the metropolitan area; since then it has spread to many other parts, including the chief tomato-growing districts. Losses in commercial crops vary greatly from year to year, but on an average it is easily the most serious disease affecting tomatoes. Suggestions are made for controlling the disease in commercial fields and gardens by methods designed to eradicate weeds and the insect vector.

Wilt due to *Fusarium* [*bulbigenum* var.] *lycopersici* has been reported from all the principal tomato-growing areas of the State, and ranks second in importance to spotted wilt, though the economic losses due to it are much less serious. The control methods recommended are as follows: seed should be from healthy plants or disinfected in mercuric chloride 1 : 3,000; fresh seed-beds should be prepared each year, and rotation should be practised. Infected plants should not be fed to stock. Affected plants should be removed and destroyed during the growing

season, and when the season is over the crop remains should be burnt, the stakes and seed-bed framework being sterilized at the same time. Varieties said to be resistant, and which growers could try, include Marglobe, Potentate, Rutgers, Break o' Day, Marhio, Australian Earliana, and Early Red Dwarf.

Tomato bacterial wilt (*Bacterium solanacearum*) is of minor importance in Western Australia compared with *Fusarium* or spotted wilt. Recorded in the State many years ago, it has since been observed, and that infrequently, only in the Geraldton and metropolitan district. Control measures are the same as for *F. b.* var. *lycopersici*, though resistant varieties are not available. Chewing insects must be combated, and the workers' hands should be washed in warm, soapy water after handling diseased plants.

McNew (G. L.). **Phytophthora infestans was destructive on Tomatoes in New York State during 1942.** *Plant Dis. Reptr.* xxvi, 23, pp. 488–492, 1942. [Mimeographed.]

During 1942 when infection of tomatoes by *Phytophthora infestans* [*R.A.M.*, xxi, pp. 474, 497; xxii, p. 45] reached epidemic proportions in western New York, detailed records were taken in a field planted to the Stokesdale variety, where five copper compounds were under test. Four applications of the fungicides were made at 14-day intervals during July and August, 200 gals. of spray being used per acre. The fungus was noted on an occasional tomato on 25th August, and by 10th September on about 2 per cent. of the fruits. The results showed that the difference between a plot sprayed with Bordeaux (4-2-50) and the unsprayed controls amounted to over 6 tons or 73·1 per cent., which represents a cash loss from the disease of about $110 per acre. Infection by *P. infestans* was directly responsible for a loss of 2·41 lb. of ripe fruit per plant, equivalent to 6,999 lb. per acre, and to this should probably be added about half the rotted fruit, not definitely identified as infected by *P. infestans*. The unsprayed plants averaged a loss of 5·4 lb. per plant from soft rot [cause unspecified], as against only 2·97 lb. for the sprayed, which gives an additional balance of 2·43 lb. (equivalent to 7,057 lb. per acre) in favour of the sprayed plants. If the remainder of the crop had been allowed to ripen, the loss from *P. infestans* would have been even greater, as 38·7 per cent. of the unsprayed unripe fruits and 2·7 per cent. of the sprayed unripe fruits showed infection. Copper oxychloride-sulphate, Tennessee tribasic copper sulphate, and copper compound A were approximately as effective as Bordeaux mixture, and yellow cuprocide only slightly less so.

Ehrlich (J.). **Recently active leaf diseases of woody plants in Idaho.** *Plant Dis. Reptr*, xxvi, 18, pp. 391–393, 1942. [Mimeographed.]

In these notes on leaf diseases of woody plants in Idaho during 1941–2 the author states that every specimen of larch (*Larix occidentalis*) leaf examined microscopically showed the fruiting structures of *Meria laricis* [*R.A.M.*, xv, p. 761]. This fungus does not appear to have been recognized before in North America, but there can be no doubt that it is firmly established in the Pacific Northwest. Necrosis of the needles of lodgepole pine (*Pinus contorta* var. *latifolia*) was commonly associated with an apparently undescribed species of *Hendersonia*. *Chlorosceptha scaveri* was repeatedly found associated with the death of *Thuja plicata* twigs. *Fusicladium radiosum* (= *Napicladium tremulae*, conidial stage of *Didymosphaeria populina* [ibid., xix, p. 51]) was aggressive in the leaves and twigs of golden aspen (*Populus tremuloides* var. *aurea*). The uredo- and teleuto-stages of *Melampsora albertensis* developed so intensely on the same host, that the foliage had turned yellow and dried by midsummer. Leaf spot (*Septoria alnifolia*) was abundantly present on Sitka alder (*Alnus sinuata*) in the summer of 1942, though, apparently, not recorded before in Idaho.

Zogg (H.). **Untersuchungen über die Gattung Hysterographium Corda, insbesondere über Hysterographium fraxini (Pers.) de Not.** [Studies on the genus *Hysterographium Corda*, particularly on *Hysterographium fraxini* (Pers.) de Not.] – *Phytopath. Z.*, xiv, 4, pp. 310-384, 19 figs., 1 diag., 27 graphs, 1943.

The first part of this comprehensive paper gives the results of biological, pathological, and cytological studies at the Federal Technical College, Zürich, on *Hysterographium fraxini*, while the second and third comprise studies on the taxonomy of the genus *Hysterographium* and of the Hysteriales in general, respectively.

*H. fraxini* is a non-specialized, facultative saprophyte, which may be responsible for extensive damage to ash (*Fraxinus excelsior* and *F. ornus*) trees in Switzerland under conditions adverse to the host, e.g., humid, sheltered situations, or waterlogged soils. The fungus enters branches of any age through fresh wounds in the spring and at first develops saprophytically, but with the expansion of the leaves it encroaches on the surrounding living tissue, spreading both upwards and downwards and turning the cortex yellow, later reddish-brown. The destruction of the underlying cambium induces a cortical depression. Towards the end of the summer the leaves above the site of infection begin to wither, since by this time the branch is almost completely girdled. Under favourable temperature and moisture conditions the fungus then proceeds downwards, killing the cells down to the fork of branch and trunk. In vigorous trees the formation of callus between the upper and lower parts of the branch arrests further growth, which in any case ceases in the late autumn at a temperature of 3° C. Re-infection can occur only through a fresh injury in healthy trees, but in those weakened by various physiological factors, the attacks of the beetle, *Hylesinus fraxini*, or bacterial diseases, no callus is formed and the fungus is able to pass direct from the already invaded branches to sound ones and finally to the trunk.

A single ascospore culture of *Hysterographium fraxini* generally produces fruit bodies with microconidia and sometimes asci and spores. The microconidia germinate and produce mycelium, but not asci. Inoculation experiments with monoascospore cultures were successful on ash, olive, lilac, *Lonicera tatarica* and *L. alpigena*, *Prunus fruticosa*, apple, vine, birch, alder (*Alnus viridis*), beech, oak, spruce (*Picea excelsa*), and larch, with the production on each of these (as well as on certain other hosts) of microconidia and hysterothecia.

After examination of material under 28 specific names, the author recognizes only five of them as valid, namely, *H. fraxini*, *H. flexuosum*, *H. formosum*, *H. elongatum*, and *H. mori*.

Walter (J. M.), May (C.), & Collins (C. W.). **Dutch Elm disease and its control.** – *Circ. U.S. Dep. Agric.* 677, 12 pp., 11 figs., 1943.

Elm trees being largely used in the north-eastern United States and elsewhere for the camouflage of cities, factories, military installations, highways, and the like, the Federal control programme during war-time is being directed towards the arrest of the spread of the causal organism of Dutch elm disease, *Ceratostomella ulmi*, in the known foci of infection and its destruction in isolated areas. It is becoming increasingly incumbent on private owners to protect their elms and carry out the sanitary measures necessary to restrict the disease, and the information here supplied is designed for their assistance in this work. The part played by the European and native elm bark beetles, *Scolytus multistriatus* and *Hylurgopinus rufipes*, respectively, in the transmission of the disease is explained, and notes are given on varietal reaction to the fungus. The recovery of affected trees, even of susceptible species, is fairly frequent if they can be protected against beetle infestation during the period of reduced vitality caused by the disease. The most damaging inoculations by the insects are those effected by the overwintering brood emerging during

May and June, so that before this time all infested wood should be burned, decorticated, or sprayed in the interval between the bursting of the leaf buds and the formation of shoots 3 in. long on American elms with fuel oil (26° to 28° Baumé) and monochloronaphthalene (12 : 1) or fuel oil and ortho-dichlorobenzene (4 : 1), using 2½ to 3 gals. for one stacked cord of wood. The same treatment may be applied to freshly felled infected wood at any time from May to September. Pruning may also be carried out at any season, and is particularly advisable in the case of old and valuable trees. All elms within 25 ft. of a removed diseased tree should be watched for several years for the development of infection on account of the common occurrence of root connexions between trees at this distance apart. It is of the utmost importance that elm wood should never be piled in the open without peeling or spraying with a bark beetle-repellant, since it constitutes an even more effective source of inoculum than standing dead trees owing to its high moisture content.

Crandall (B. S.). **Thyronectria disease of Honey Locust in the South.** *Plant Dis. Reptr*, xxvi, 17, p. 376, 1942. [Mimeographed.]

*Gleditsia triacanthos* throughout middle and western Tennessee and the northern half of Mississippi and Alabama is affected by the canker disease due to *Thyronectria austro-americana* [*R.A.M.*, xix, p. 376]. The cankers may be as small as a pin's head or reach ½ in. in diameter. Eventually they enlarge or coalesce and girdle the branch. The fungus also penetrates the vascular system, producing reddish-brown streaking of the outer wood for several inches in each direction from the visible canker. A gummy exudate is present on many cankers. In Tennessee some trees succumb to the disease, but in many areas healthy trees are found near dying ones for a number of consecutive seasons; apparently, considerable natural resistance to infection exists.

Arruda (S. C.). **Observações sôbre algumas doenças do Eucalipto no Estado de S. Paulo.** [Observations on some Eucalyptus diseases in the State of São Paulo.]—*Biológico*, ix, 6, pp. 140–144, 5 figs., 1943.

The most important disease of *Eucalyptus* seedlings in São Paulo is the etiolation and strangulation, followed by rapid wilting and death, caused by *Cylindrocladium scoparium* [*R.A.M.*, xix, p. 221]. Control of the pathogen by soil sterilization with hot water or formalin is a costly process justifiable only for special reasons, the ordinary method consisting in renewal of the soil for the frames and the application to the walls of creolin or a 5 per cent. copper sulphate solution. Soils of an unduly compact texture accumulate an excess of humidity favourable to the growth of the fungus.

*E. citriodora* is the only species which has been observed to suffer from gummosis (*Phytophthora parasitica*). According to E. Navarro de Andrade ('O Eucalypto e suas applicações', Part I, 143 pp., Secr. Agric., São Paulo, 1928), plantings of the same species and *E. robusta* were attacked in the vicinity of the city of São Paulo by *Phytomonas* [*Bacterium*] *tumefaciens*, causing a mortality of 95 per cent., and the writer has also detected the same organism in plants originating in the United States and Chile.

Nowak (A.). **Neue Erkenntnisse über Holzimprägnierung.** [New knowledge concerning timber impregnation.]—*Dtsch. Bauztg*, lxxvi, 9, pp. 201–202, 1942. [Abs. in *Holz Roh- u. Werkstoff*, vi, 2, p. 68, 1943.]

In the writer's new method of timber impregnation the wood is saturated with water repellants, such as coal tar pitch, bitumen, or ozocerite, in trichlorethylene as a solvent, the latter being recoverable. The treated wood does not swell appreciably and absorbs considerably less moisture than untreated. By reason of its

comparatively dry state the impregnated wood is highly resistant to fungal damage, so that the addition of any specially toxic fungicide to the preservative is superfluous.

Schrenk (H. von). **A wood-destroying fungus on Gum ties at Jacksonville, Florida.** *Plant Dis. Reptr*, xxvi, 11, p. 260, 1942. [Mimeographed.]

A wood-destroying fungus occurring in large numbers on railway sleepers of red or sweet gum (*Liquidambar*), tupelo (*Nyssa*), and black gum (*Nyssa*) wood in Florida, was identified as *Stereum rugosiusculum* [*R.A.M.*, xix, p. 239].

Nobles (Mildred K.). **A contribution toward a clarification of the Trametes serialis complex.** *Canad. J. Res.*, Sect. C, xxi, 7, pp. 211–234, 4 pl., 1 fig., 5 diags., 1943.

The fungus frequently isolated from a destructive, brown, cubical rot of timber or, more rarely, living trees of Sitka spruce (*Picea sitchensis*) and Douglas fir (*Pseudotsuga taxifolia*), had been originally identified by K. St. G. Cartwright on the basis of its cultural characters as *Trametes serialis* [*R.A.M.*, ix, p. 617]. Later it was recognized that the identification had been incorrect, but the name was retained for the time being. Since then the fungus has been identified with a fruit body collected by J. E. Bier on *Picea sitchensis* in the Queen Charlotte Islands, British Columbia, and shown to be a new species. It is here described under the name *Poria microspora* Overholts. In morphological, cultural, and interfertility studies, the author also examined three other species which had been previously confused with *T. serialis*, namely, *P. sequoiae*, *Polyporus palustris*, and a new species, *Poria carbonica* Overholts. On the basis of these studies descriptions are given of all five species, and a brief key for their identification is provided. In interfertility studies the formation of clamp-connexions in all or most of the pairings was accepted as positive proof that the two partners were of the same species, and their complete absence that they belonged to different species. *P. microspora* is characterized by the evanescent nature of the fruit body. The author quotes a letter by Clara W. Fritz for the opinion 'that much of the incipient decay in Douglas fir, which has previously been thought due to *Fomes pini*, is really the result of attack by *P. microspora*'. The cultures of *T. serialis* are easily recognizable by the characteristic fruiting surface, which appears early and eventually spreads over the entire colony, by the abundance of fibre hyphae, and by the nodose-septate hyphae with small refractive projections along their walls. The cultures of *P. sequoiae* resemble those of *T. serialis* in growth rate, but are readily distinguished from them by the absence of fibre hyphae and the resultant lack of toughness in the mat. *Polyporus palustris* differs from the other species examined in its white, cottony mycelium with isolated patches of raised well-formed fruiting surfaces, abundance of fibre hyphae, and rapid growth on gallic and tannic acid agars. Cultures of *Poria carbonica* resemble those of *F. officinalis* in the abundance of secondary spores, but are easily separated from this and other species by the presence of rigid, thick-walled, much-branched hyphae, which are conspicuous under the microscope.

**Hosts of viruses on vegetable seedlings.** *Plant Dis. Reptr*, xxvii, 5–6, pp. 146–148, 1943. [Mimeographed.]

Host lists for tobacco mosaic, cucumber mosaic, and spotted wilt viruses have been compiled by the Department of Plant Pathology, Cornell University, for the benefit of florists who have taken to growing vegetable seedlings to meet the war-time demands of small garden-owners. The list only includes hosts likely to be affected under New York conditions.

Middleton (J. T.). **Disease control with fermate and spergon.** —*Plant Dis. Reptr.* xxvii, 7–8, pp. 169–170, 1943. [Mimeographed.]

In glasshouse and field tests in California adequate control of the downy mildews of onion and belladonna (*Atropa belladonna*), caused by *Peronospora destructor* [*R.A.M.*, xxi, p. 63] and *P.* ? *hyoscyami* [ibid., xxi, p. 222], respectively, and of the powdery mildew of cantaloupe (*Erysiphe cichoracearum*) [ibid., xxii, p. 193] was achieved with spergon and fermate, both used at the rate of 1·5 lb. per 100 gals. water. Tomato late blight (*Phytophthora infestans*) was controlled by spergon at 0·25 lb. per 100 gals., but fermate at 1·5 lb. was not appreciably effective.

Davis (B. H.). **New seed protectants.** *Plant Dis. Reptr.* xxvii, 5–6, pp. 150–151, 1943. [Mimeographed.]

In experiments conducted at the New Jersey Agricultural Experiment Station seeds of ten vegetable crops were treated with spergon, thiosan, and tuads, as well as with semesan and red copper oxide for comparison, to test their value against seed decay and damping-off [cf. *R.A.M.*, xxii, p. 261]. All three materials were uninjurious to the seeds. Thiosan and tuads both seemed to give as effective protection as organic mercury (semesan), but they were not so effective as red copper oxide for beets and spinach. The results with spergon were inconsistent: it was as effective as the other chemicals on beans, Lima beans [*Phaseolus lunatus*], and peas, but less so on beet and spinach. [Further details of these tests are given by Davis (B. H.) & Haenseler (C. M.) in *Plant Dis. Reptr.* xxvii, 7–8, pp. 170–171, 1943.]

Stahmann (M. A.), Link (K. P.), & Walker (J. C.). **Mustard oils in crucifers and their relation to resistance to clubroot.** *J. agric. Res.*, lxvii, 2, pp. 49–63, 1 graph, 1943.

In a study in Wisconsin on the role of mustard oils in resistance to club root, *Plasmodiophora brassicae* [*R.A.M.*, xxi, p. 442], in crucifers, the principal oil found in the roots of all five crucifers examined, was beta phenethyl isothiocyanate, allyl isothiocyanate occurring only in the roots of horse-radish. The former was isolated from the root tissue of resistant and susceptible strains of turnip and black mustard (*Brassica nigra*) and from susceptible strains of white mustard (*B. alba*) and horse-radish. Quantitative estimation of the total mustard oil content and the relative myrosin activity of root tissue, based on improved analytical methods, failed to show any correlation of isothiocyanate content or thioglucosidase activity to resistance or susceptibility to club root. It is concluded that mustard oils play no part in resistance to club root in roots of crucifers.

Hildebrand (A. A.) & Koch (L. W.). **Rhizopus root rot of Sugar Beet.** *Canad. J. Res.*, Sect. C, xxi, 8, pp. 235–248, 2 pl., 1 fig., 1 graph, 1943.

Sugar beets growing in an experimental plot at the Harrow Laboratory, Ontario, were destroyed in 1942 by a root rot of a type that has been reported only once previously on this host in North America by H. A. Edson (*J. agric. Res.*, iv, pp. 135–168, 1915). The disease causes a wilting of leaves, which at first recover every night but soon become permanently flaccid and eventually turn brown and dry up completely; the tap-root shows a greyish-brown, later almost black rot, which spreading from the base upwards, ultimately covers the entire surface and penetrates deep into the internal tissues. The affected areas, which are clearly delimited from the healthy ones, are spongy and have a strong smell suggestive of acetic acid. Isolations from diseased roots yielded a species of *Rhizopus* in 212 out of 240 tissue plantings. Inoculations of roots with pure cultures of this species were successful in all cases where inoculum was placed in wounds produced by

a cork borer or by wedge excision; but where inoculum was applied to the scalpel puncture type of wound or to an uninjured root, slight infection was obtained in only two out of 24 cases. The causal organism was identified as *R. arrhizus*. In comparative cultural tests *R. nigricans* [*R. stolonifer*] made optimum growth at 24° to 26° C., showing no appreciable growth at 29° to 31° even after 72 hours; *R. arrhizus* and *R. oryzae* made optimum growth at 34° to 36°, with considerable retardation at 39° to 41°. All three species proved capable of infecting wounded beets; their pathogenic capacity varied according to temperature. Thus, whereas the damage caused by *R. stolonifer* was appreciable after four and serious after 21 days at 14° to 16°, but decreased at 20° to 22°, and was quite negligible at 29° to 31°, that caused by the other two species was relatively small at the lowest level, gradually increasing with rising temperature and becoming so destructive at 39° to 41° that roots were completely rotted after four days. The lesions produced by *R. arrhizus* and *R. oryzae* were in general of a deeper brown colour and more clearly delimited from healthy tissue than were those caused by *R. stolonifer*. The conclusion drawn from these investigations is that certain species of *Rhizopus* constitute a potential threat to sugar beets, especially those that have been injured in harvesting or transit and subsequently stored under conditions favourable to infection.

Young (H. C.). **Fertilizer in relation to black root.** —*Sugar*, xxxviii, 9, pp. 35–36, 1943.

This is an abstract of a paper read at a meeting of the Eastern Sugar Beet Technologists in January, 1943. Black root [*R.A.M.*, xix, p. 637], besides causing tonnage losses of varying extent in different beet-growing regions, affects the sugar content and purity of the juice. During the last 20 years the beet yields in north-western Ohio have sunk from 12 or 15 to 5 tons per acre owing to the depletion of organic matter and other biological and physical changes in the soil, but with the recent replacement of organic matter production has greatly improved, and the incidence of black root has fallen, particularly where phosphoric acid has also been added, either alone or in combination with nitrogen and potash; the two latter are ineffectual by themselves. The phosphate operates most actively when placed just below the seed. In one locality a mixture of manure and fertilizers resulted in almost perfect stands, the yields of which amounted to 20 tons per acre and upwards, black root being automatically combated at the same time.

Young (H. C.). **Control of the blight of the Sugar Beet.**—*Sugar*, xxxviii, 9, p. 36, 1943.

In this abstract of a paper presented at a meeting of the Eastern Sugar Beet Technologists in January, 1943, it is stated that dusting or spraying against beet leaf spot (*Cercospora*) [*beticola*] has resulted in increases of yield up to 6 tons per acre and a rise of 1½ per cent. in the sugar content over a five-year experimental period. Much of the beet-growing territory of Ohio has consequently been equipped with the necessary machinery for fungicidal treatments. The standard formula for dusts is 14 lb. each of fixed copper (50 per cent. metal) and bentonite, WB25–325 mesh and 72 lb. talc, 325 mesh, or 20–80 monohydrated copper-lime, and for sprays either 4-6-100 Bordeaux mixture or a fixed copper 2 or 3-100. Quite apart from leaf spot control the copper was shown by a one-year test to exert a direct stimulus on the plants, producing substantial increases in tonnage yields.

Nitsche (G.) & Förster (H.). **Rübenblattwanze.** [The Beet leaf bug.]—*Mitt. biol. Anst.* (*Reichsanst.*), *Berl.*, 65, pp. 98–99, 1941. [Abs. in *Z. PflKrankh.*, lii, 12, p. 556, 1942].

Adults of the beet leaf bug (*Piesma quadrata*) collected on crinkled plants [*R.A.M.*, xix, p. 318] during the summer and autumn were successful in the

transmission of the virus only in individual cases, whereas 99 per cent. positive infections were obtained after hibernation. Inoculation experiments with nymphs from diseased plants gave negative results, but in the adult stage following hibernation they proved to be vectors of the virus, in spite of having fed as larvae exclusively on healthy seedlings.

Cass Smith (W. P.). **Bean rust.**—*J. Dep. Agric. W. Aust.*, Ser. 2, xx, 1, pp. 77–79, 2 figs., 1943.

During February, 1943, a serious epidemic of bean rust (*Uromyces appendiculatus*) [*R.A.M.*, xxi, p. 244] developed in market gardens in the Balcatta and Osborne Park districts of Western Australia, many crops being ruined. Plantings on muck, or peaty swamp soils, where atmospheric humidity was high, were more seriously affected than those on light sandy soils under sprinklers. French bean varieties, though affected, were highly resistant compared with runner types. This appears to be the first authentic record of bean rust in Western Australia, but the disease has almost certainly been present in the metropolitan area for some years, at least to a limited extent.

The most suitable control method would appear to be the growing of resistant varieties of the French bean type. Lime-sulphur (1 in 80 to 1 in 100) or a dust containing equal parts of sulphur and air-slaked lime should be applied as soon as the disease is noticed, subsequent treatments being made at weekly intervals until weather conditions no longer favour infection. After harvesting, all crop remains should be removed and destroyed.

Brandão (J. S.). **Algumas doenças do Alho.** [Some Garlic diseases.]—Reprinted from *Bol. Minist. Agric., Rio de J., 1942*, 6 pp., June, 1942.

Popular notes are given on the symptoms and control of the following diseases affecting garlic in Brazil, where Minas Geraes is the leading State in the production of the crop: white rot (*Sclerotium cepivorum*), rust (*Puccinia allii*), purple leaf spot (*Macrosporium* [*Alternaria*] *porri*), mildew (*Peronospora destructor*), dry rot (*Fusarium* sp.), and soft rot (*Bacillus carotovorus*) [*Erwinia carotovora*].

Hopkins (J. C. F.). **Diseases of fruit, flowers, and vegetables in Southern Rhodesia. 7—Common diseases of Lettuce.**—*Rhod. agric. J.*, xl, 4, pp. 239–241, 7 figs., 1943.

Popular notes are given on the symptoms, cause, and control of the following lettuce diseases in Southern Rhodesia: damping-off, mosaic [*R.A.M.*, xviii, p. 649], tipburn [ibid., xx, p. 242], and leaf spot (*Septoria lactucae*) [ibid., xxi, p. 182].

Whitaker (T. W.) & Pryor (D. E.). **Demonstrating downy mildew (Bremia lactucae) in Lettuce.**—*Stain Tech.*, xviii, 3, pp. 121–123, 1 fig., 1943.

Lettuce leaves are placed dorsal side upwards in a moist Petri dish inoculated with a conidial suspension of *Bremia lactucae*, and incubated at 12·5° C. After incubation the material is fixed in an acetic acid-alcohol mixture (1 : 3) for 3½ to 4 hours, the fixing fluid decanted and replaced by a solution of lactophenol-alcohol, and the material transferred to a clean, dry slide and flooded with 1 per cent. cotton blue (aniline blue W.S.) in 90 per cent. alcohol. The host tissues remain colourless in contrast to the fungus, which is stained dark blue.

Hassebrauck (K.). **Zur Frage der Verwendung kupferhaltiger Spritzmittel im Kampf gegen den Spargelrost.** [A contribution to the question of the application of copper-containing sprays in the campaign against Asparagus rust.]—*Phytopath. Z.*, xiv, 1, pp. 76–82, 1942.

This is a critical discussion of the results of experiments on asparagus rust

[*Puccinia asparagi*] control by means of copper sprays, with special reference to those of Hülsenberg [*R.A.M.*, xviii, p. 649], to whose optimistic conclusions on the value of the treatment the author does not subscribe. Not only are the toxic effects of the fungicides inadequate, but they are too uncertain to be recommended for general practice. At the same time, pending the development of a more effective remedy, copper-containing sprays must still be employed within reasonable limits, especially on young plantings, where they may successfully avert an epidemic.

Wiant (J. S.). **An analysis of market inspection reports on spoilage of Cantaloups and related Melons.**—*Plant Dis. Reptr. Suppl.* 138, pp. 145–161, 1942. [Mimeographed.]

An examination of inspection certificates of a total of 9,890 car lots of melons from Arizona, California, and Colorado, unloaded during 1933, 1934, 1935, and 1941 at New York City markets [*R.A.M.*, xvii, p. 723] (representing approximately half the melons received there from these states during the four years) showed that decays (*Rhizopus*, *Alternaria*, *Fusarium*, *Cladosporium*, and *Phytophthora*, occurring in this order of importance) or moulds [unspecified], or both, were present in 4,400. In these an average of 4·7 per cent. of the melons were affected with decay and 4·8 per cent. with mould; or calculated for the total of 9,890 car lots, 2·1 per cent. decay, and 2·1 per cent. mould, or 4·2 per cent. total spoilage.

A summary is also given of the results of inspections of 3,380 car lots of cantaloupes and 574 of Honey Dew melons from a number of States made at several markets during the period 1922 to 1928 inclusive. Decay was present in 22·2 per cent. of all car lots, with an average of 10·7 per cent. in each; or on the basis of all car lots, decay averaged 2·4 per cent. of all melons inspected.

Middleton (J. T.) & Whitaker (T. W.). **A lethal virus disease of Cantaloup occurring in the Imperial Valley.**—*Plant Dis. Reptr*, xxvi, 15, p. 331, 1942. [Mimeographed.]

A destructive disease of cantaloupes, caused by a strain of the cucumber mosaic virus, is reported from the Imperial Valley of California, where approximately 75 per cent. of the crop was lost in two early plantings comprising 250 acres. The symptoms consisted in a sudden dying of the older leaves and subsequent yellowing of the runners, which collapse two to four days later, and in necrotic streaks on the stems of the runners. Unlike the common cantaloupe mosaic, which has been prevalent in the same region for many years, the new disease shows no mosaic pattern on older leaves and only a very faint one on the younger leaves. Greenhouse inoculations with juice from diseased plants were successful with cantaloupes, and also with squash and cucumber, producing in the last-named two hosts symptoms similar to those of the common cucumber mosaic virus. Owing to the lethal effect of this strain of cucumber virus on cantaloupe, it is considered improbable that it is seed-borne.

Pinckard (J. A.) & Anderson (W. S.). **New disinfectants for Sweetpotatoes.**—*Plant Dis. Reptr*, xxvii, 5–6, pp. 151–153, 1943. [Mimeographed.]

Of the various seed-piece disinfectants tested at the Mississippi Agricultural Experiment Station in 1942 for controlling black rot disease of sweet potato (*Ceratostomella fimbriata*) [*R.A.M.*, xxi, p. 515], sinox and elgetol showed promise, while spergon, used with a wetting agent, was of little value.

Manns (T. F.). **A new root-dip treatment for Sweet Potato sprouts to control wilt.**—*Trans. Peninsula hort. Soc.*, xxxii, 5, pp. 80–81, 1943.

In field tests carried out in Delaware in 1942 root-dip treatments of sweet

potato against wilt [*Fusarium oxysporum* f.2 and *F. bulbigenum* var. *batatas*] with spergon [*R.A.M.*, xxi, p. 360] gave 33·4 per cent. average increased yield over the untreated controls, as against 8·4 per cent. for improved semesan bel and 13·1 per cent. for yellow cuprocide.

PORTER (R. P.). **Seed-borne inoculum of Phomopsis vexans—its extent and effects.** *Plant Dis. Reptr*, xxvii, 7–8, pp. 167–169, 1943. [Mimeographed.]

Spores of *Phomopsis vexans* [*R.A.M.*, xxii, p. 194] were found in 6 of the 27 seed samples of 12 varieties of eggplant examined at the Virginia Truck Experiment Station, all six belonging to the variety Black Beauty. Seed artificially contaminated with *P. vexans* planted in sterile soil reduced the stand by 10·7 per cent., healthy seed in contaminated soil showed a reduction of 19·8 per cent., and contaminated seed in contaminated soil one of 22·5 per cent. of that obtained with healthy seed in sterile soil, indicating the importance of using disease-free seed and planting in disease-free seed-beds.

**Soya Beans in South Africa.** *Bull. Dep. Agric. S. Afr.* 240, 58 pp., 16 figs., 1943.

Included in this summary of the available information on the production, economic aspect, and nutritional and industrial uses of soy beans, now coming into general commercial cultivation in South Africa, is a brief note on the few diseases affecting the crop in its new habitat, of which only one, bacterial blight (*Bacterium glycineum*) [*Pseudomonas glycinea*] has so far been of much importance. Other diseases of more or less sporadic occurrence are powdery mildew [*Erysiphe polygoni*], downy mildew [*Peronospora trifoliorum*], anthracnose [attributed in most countries to *Glomerella glycines*: *R.A.M.*, vi, p. 75], and *Sclerotium* wilt [*S. rolfsii*].

MCLAUGHLIN (J. H.). **Notes on diseases of Soybeans and other Legumes in Oklahoma.** *Plant Dis. Reptr*, xxvi, 16, pp. 356–359, 1942. [Mimeographed.]

During 1941, of 30 varieties and selections of field soy beans growing on the Oklahoma Experiment Station farm, only Chief, Arksoy 152, and C-146 remained relatively unaffected by *Phytomonas* [*Xanthomonas*] *phaseoli* var. *sojense* [*R.A.M.*, xviii, p. 379]. None of 27 edible varieties showed resistance, though Fuji developed only moderate infection. In another test of field soy-beans, grown from seed obtained locally, Habaro and Scioto were slightly infected, while Ogden showed a trace of infection.

TERVET (I. W.). **Soybean diseases in Minnesota.** *Plant Dis. Reptr*, xxvii, 5–6, pp. 135–138, 1943. [Mimeographed.]

Reactions of 50 varieties and selections of soy-bean to mosaic, mottle leaf, and bacterial blight (*Phytomonas* [*Pseudomonas*] *glycinea*) [*R.A.M.*, xix, p. 256] were recorded during 1942 in Minnesota. The records show that although some varieties are immune from mosaic or mottle leaf, or both, none is immune from bacterial blight. Those immune from both viruses are F.P.I. Nos. 79619 and 92470, Minn. Sel. Nos. 118, 120, and 123 of Wis. Manchu No. 3, Minn. Sel. No. 107 of Minn. Manchu, and Holland No. 11.

CHRISTENSEN (C. M.). **Common edible Mushrooms.**—x + 124 pp., 4 col. pl., 62 figs., 2 diags., Minneapolis, University of Minnesota Press, 1943. $2.50.

In this attractively presented book 47 varieties of edible wild fungi, classed according to the spore print, are described in detail. The author suggests that the novice should learn to recognize a few species well and avoid all others, a chapter on 'the fool-proof four' being devoted to four common and easily recognizable species. The concluding section of the book deals with mushroom cookery.

Thomas (K. M.), Ramakrishnan (T. S.), & Narasimhalu (I. L.). **Paddy straw Mushroom.**—*Madras agric. J.*, xxxi, 2, pp. 57–59, 1 fig., 1943.

Full directions, based on the system employed by U. T. Su in Burma, are given for the cultivation of the 'paddy straw' mushroom (*Volvaria diplasia*) in Madras [*R.A.M.*, xx, p. 100].

Săvulescu (T.). **Rumania. Bacterial gummosis of the Sugarbeet.**—*Int. Bull. Pl. Prot.*, xvii, 3, pp. 34M–39M, 1943.

During 1942, sugar beets were attacked by bacterial gummosis [*R.A.M.*, vii, p. 294] over almost the entire area devoted to this crop in the Danubian Plain of Rumania, from the Dolj Department to the Ialomita Department. The total crop, which usually amounts to 6,000 wagon-loads, was reduced to 3,000, of which only 2,400 could be utilized. As the affected beets contained an appreciable quantity of inverted sugar, and as impurities were 10 to 20 or even 30 per cent. above normal, the qualitative and quantitative production showed an estimated loss of 70 to 80 per cent. and even more in some areas. The disease was favoured by prolonged drought. Excessive and prolonged dry spells in summer reduce the osmotic force of the roots. This produces the first characteristic symptom, the shrivelling of the root tips. There is then no sign of rot, but the beets remain small.

Absence of boron is the main predisposing factor, both as regards this bacterial gummosis and the heart rot that follows wet weather. The intensity of both conditions is also directly related with the calcium carbonate content of the soil. It was found that these diseases do not appear in fields containing under 2 or over 8 to 9 per cent. calcium carbonate, while they commonly occur in soil containing 3 to 4 per cent. Bacterial gummosis is very frequent in soils with a reaction of $P_H$ 7·3 to 7·8, but as soon as alkalinity is reached, intensity does not vary parallel with the $P_H$. Sugar beet soils locally are usually rich in potassium and poor in phosphorus. There is no direct correlation between the content of plant nutrients in a given soil and the prevalence of the disease.

Beets predisposed to disease as indicated above are attacked first by '*Bacillus betae*', which was abundantly present in the mucilage of affected beets. Other bacteria isolated included *B.* [*Erwinia*] *bussei* and '*B. lacerans*', and the organism also found by the author in 1924 [loc. cit.]; this liquefies gelatin, does not produce gas, develops rapidly on agar, and inverts sugar. With these are associated saprophytic bacteria and fungi. In stored diseased beets yeasts transform the inverted sugar into alcohol, and the acetic fermentation ensues.

Sugar beets should not be cultivated for at least three years in any field that has shown the condition. A four-year rotation should be closely followed. Soils with over 3 per cent. calcium carbonate, or very light soils, should be avoided. In the Danubian Plain preference should be given to the river banks, where the water level is high. Applications of borax (20 to 30 kg. per ha.) have always been beneficial. Beet seed should be disinfected by 15 minutes' immersion in a solution of formalin (250 gm. per 100 l. water). Once the disease has appeared, all diseased plants must be pulled up and burnt on the spot. Diseased beets sent to the mills must also be burnt. Good methods of cultivation are essential, and resistant varieties must be selected.

Moinat (A. D.). **Nutritional relationships of boron and indoleacetic acid in Head Lettuce.**—*Plant Physiol.*, xviii, 3, pp. 517–523, 2 figs., 1943.

In greenhouse studies conducted at the University of Chicago with lettuce plants of the variety New York the addition of as little as 0·005 p.p.m. of boron to the nutrient solution prevented the development of boron deficiency [*R.A.M.*, xxi, p. 317] symptoms, while indoleacetic acid sprayed on the leaves failed to do so; neither treatment prevented the appearance of tipburn [ibid., xx, p. 242].

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